

**THE BUTTERFLIES OF THE
MALAY PENINSULA**

Not to be lent out.



TROGONOPTERA BROOKIANA (WALLACE)

Known as "Raja Brooke's Birdwing," this truly Malaysian butterfly is found only in primeval forest in Malaya and the larger islands except Java. While the male may be seen in some numbers at damp spots on forest paths, the rare female (here shown) prefers higher elevations and is found flying high among the trees. The butterfly was first discovered by A. R. Wallace in Borneo in 1855, and the life history is still unknown.



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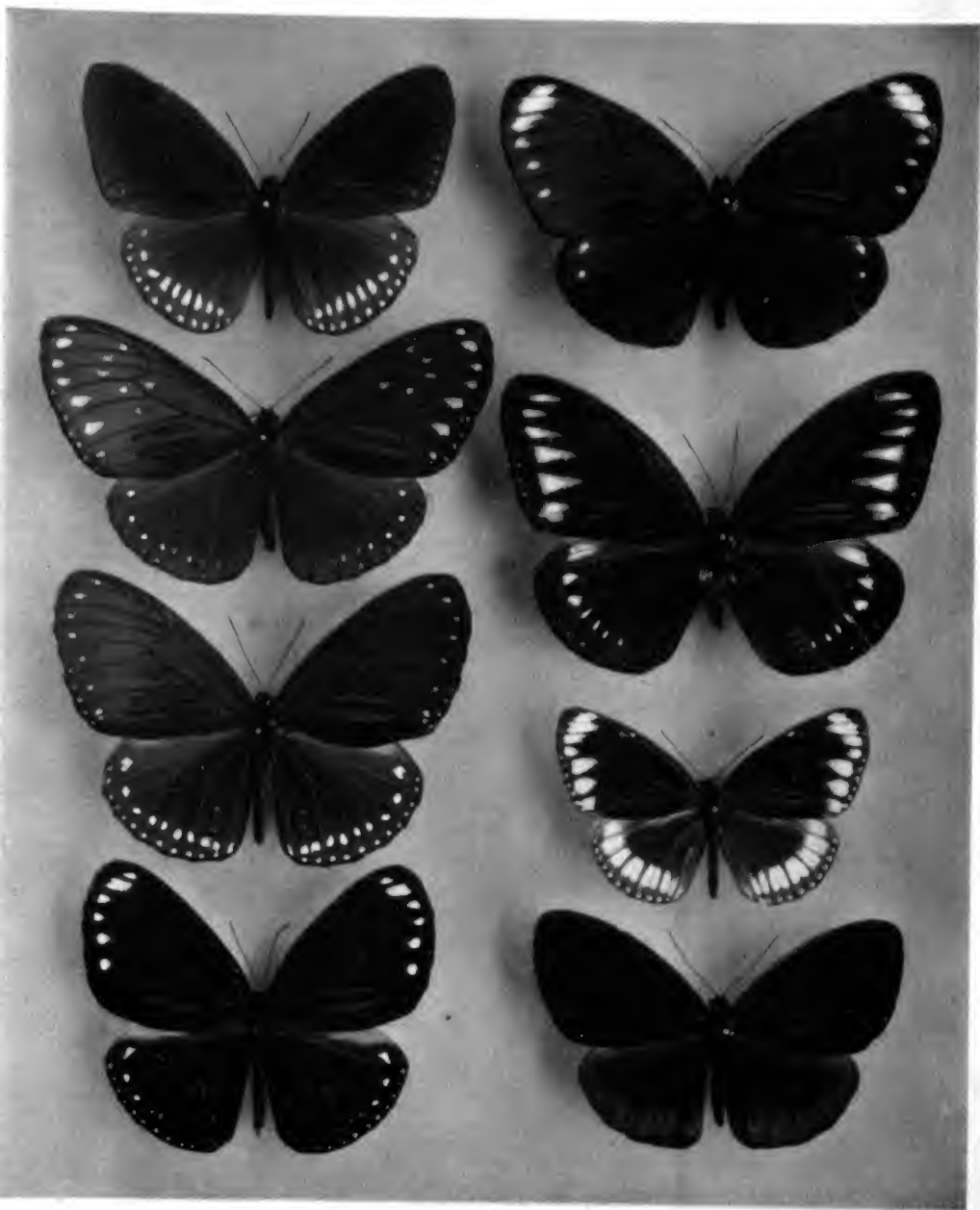
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THE BUTTERFLIES OF THE MALAY PENINSULA

by

A. STEVEN CORBET

and

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Director of Museums, F.M.S., 1938 to 1945

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REFERENCE .

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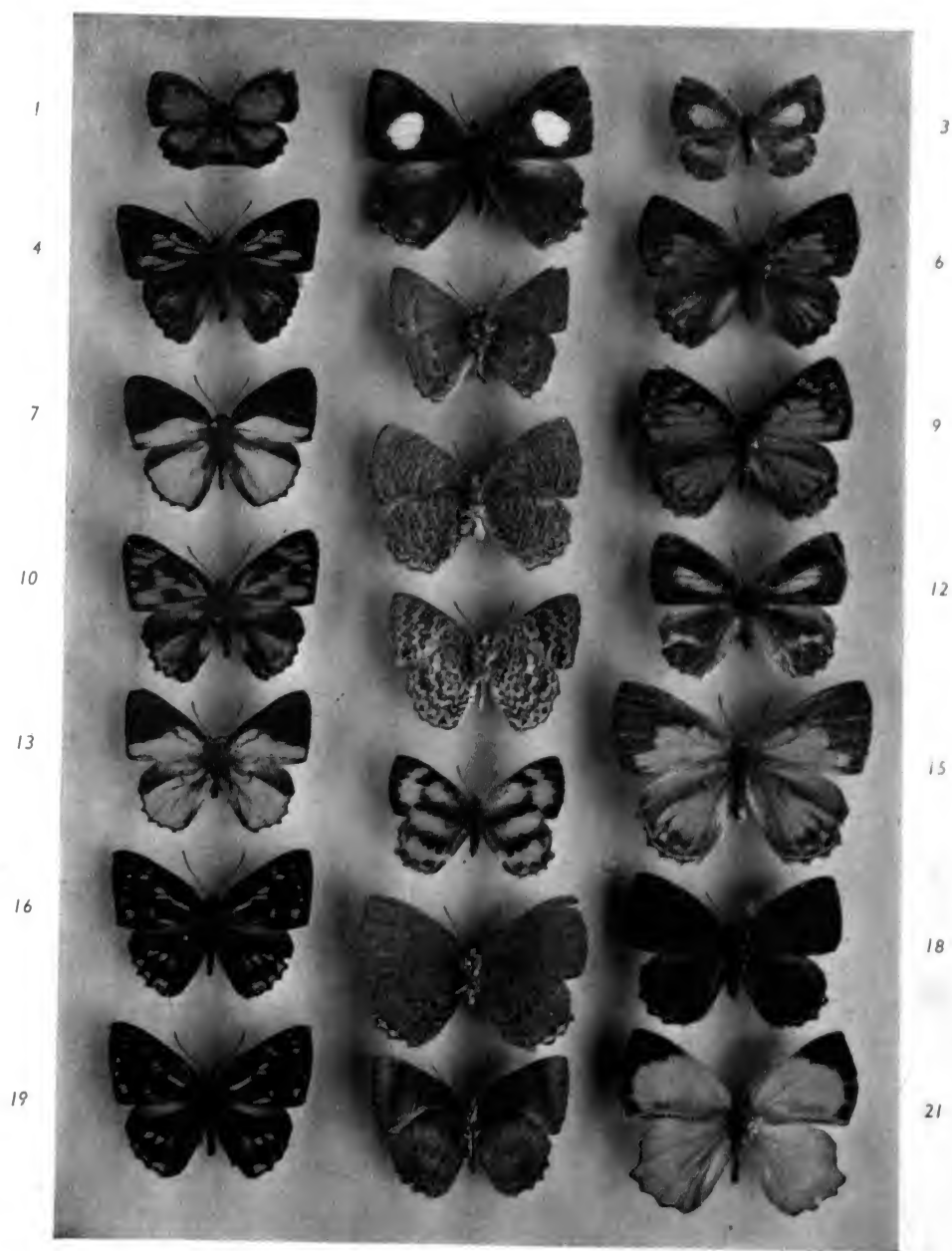
PREFACE

WHEN Pendlebury and I began the revision of the butterflies of the Malay Peninsula on a scientific basis, we were quite unaware of the immensity of the task. In the days of our illustrious predecessor, W. L. Distant, the author of *Rhopalocera Malayana*, it was customary to regard each insular race which differed perceptibly from any other as a separate specific entity, although Distant himself held other views. Nowadays, the entomologist sees the distribution pattern of the butterflies in the Malay Archipelago, not as a mosaic of innumerable slightly differentiated forms, each with a restricted insular range, but as an orderly assemblage of far fewer widely distributed species of which, usually, each island or small archipelago has its own distinctive geographical race (or subspecies, as it is now called).

However, it is one thing to recognise the true state of affairs and another to turn the knowledge to account. As far as the Indo-Australian Region is concerned, considerable progress was made in this direction by the authors of Seitz's *Macrolepidoptera of the World* (1908-1928), although, almost always, they left unsettled the status of the forms in the Philippines and Celebes. We have investigated all such cases in which it appeared obvious that the Malaysian forms were conspecific with butterflies from the Indian Empire, the Philippines or Celebes, and where forms from these latter countries have the older name; but there are still some less definite cases (concerning butterflies from Celebes) awaiting detailed examination, and, until these have been settled, there can be no finality as regards the nomenclature of the Rhopalocera of the Oriental Region. In so far as we have been able to complete these investigations, the nomenclature of the present edition differs from that employed in the first.

The systematic arrangement here followed is, in general, that given in Seitz's *Macrolepidoptera of the World*, except that the Lycaenidae are classified as in the second edition of Evans' *Identification of the Indian Butterflies*, and the Hesperidae as in that author's *Catalogue of the Hesperidae of Europe, Asia and Australia*.

During the last fifteen years I have examined almost all the important extant collections of Malayan butterflies, ranging from that made by Dr. J. G. Koenig (a pupil of Linnaeus) in 1779 to those made in prison camps and behind the enemy lines during the Japanese Occupation. To the curators and owners of these collections I tender my warmest thanks, and especially to Major G. F. Cowan and Major J. N. Eliot, who have allowed me to make full use of their magnificent and remarkably



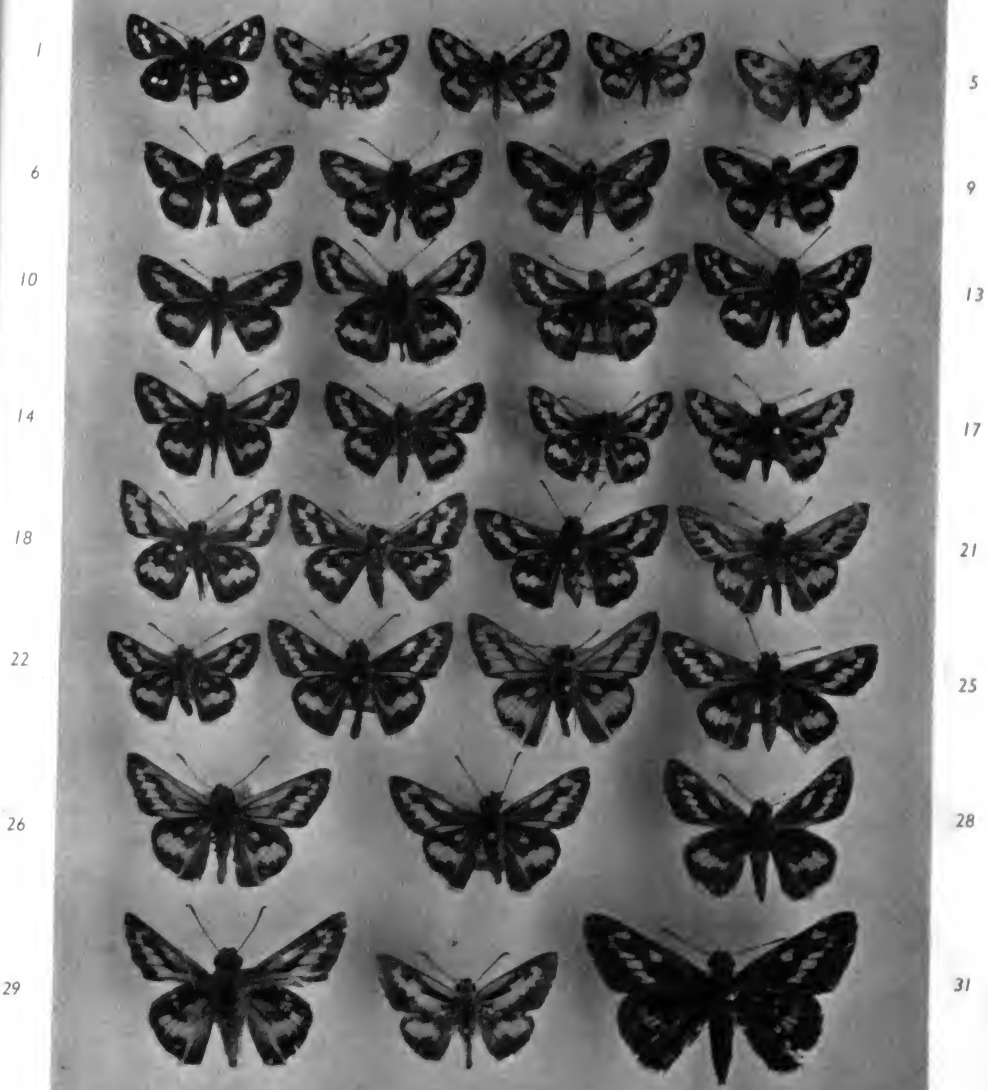
complete collections. To Messrs. H. Gunner, F. C. van Ingen, J. E. Kempe, M. J. V. Miller, A. Sleep, and G. C. Stubbs, Major J. A. Hislop, Dr. L. Richmond Wheeler and Brigadier A. W. G. Wildey, I am indebted for gifts of Malayan specimens of particular interest.

The photographic illustrations of Malayan butterflies on plates 31 to 55 are from specimens in Major Cowan's collection, with the exception of figures 1, 2, 5, 6, 25, 46, 82-86, 135, 140, 146, 148-150, 163, 176, 183, 184, 186, 187, 200, 207, 208, 222, 236-238, 243, 244 and 251, which are from specimens in the British Museum (Natural History), and figures 7, 10, 21, 28, 29, 32-35, 44, 48, 70, 80, 100, 104, 106, 124, 134, 221 and 250, which are from butterflies in my own collection. The specimens depicted in the coloured plates are in the British Museum (Natural History).

To Mr. W. H. T. Tams I am indebted for the photographs of the Linnaean butterflies on plate 29 and for the enlarged reproduction of *Arhopala* specimens in the British Museum on plates 49 to 55. The other photographs, including those in colour, were taken in the Photographic Department in the British Museum by Mr. M. G. Sawyers, whose skill and enthusiasm have made a valuable contribution to this book. Thanks are due to the Trustees of the British Museum (Natural History) for permission to make photographs of the specimens mentioned above and of the butterflies in the Banks Collection shown on plate 30. Thanks are due also to the Linnean Society of London for facilities to study the Linnaean Collection of insects.

Except for the map of Malaya facing page 29, for which I am indebted to Mr. G. C. Stubbs of the Malayan Survey Department, the line drawings have been made by myself, and, in order to show clearly such structures as the palpi and legs, these organs have been drawn after removal of the scales. The figures of larvae and pupae are adapted from those in Horsfield and Moore, *Catalogue of the Lepidopterous Insects in the Museum of the Hon. East-India Company*, 1, except figure 135, which is from illustrations by the late Dr. T. A. Chapman, and figures 62, 70 and 71, which are adapted from figures in *Rhopalocera Javanica*, 3, and I take this opportunity of expressing my appreciation of Professor W. Roepke's help and interest over a period of years.

In the course of the revisional work which preceded the writing of this book, I have received much help and encouragement from Mr. N. D. Riley, Keeper of the Department of Entomology in the British Museum (Natural History), and from my colleague, Mr. A. G. Gabriel in the same Department. In fact, without their aid, such a comprehensive survey of the subject would hardly have been possible. Brigadier W. H. Evans has generously placed at my disposal the results of his extensive work on the Oriental Hesperidae, and has taken an active interest in the preparation of this book. To these gentlemen, I am deeply grateful. I am indebted also to my wife for her continued help and co-operation from



the day when we first collected butterflies together in Malayan forests. There are other friends and correspondents, too numerous to mention individually, who have helped me in various ways with this book.

An important addition to this new edition is the series of camera lucida drawings of genitalia on plates 2 to 21. These have been selected to show the remarkable diversity of form in these organs throughout the Oriental Rhopalocera. In genera and species-groups where identification depends on primary sexual characters, the male genitalia of all the species concerned are depicted. Thus, with the possible exception of a few of the more difficult species of *Arhopala*, it should now be possible to identify the males of any Malayan species of butterfly with certainty.

It is a matter of the deepest regret to me that my friend and partner in this project, H. M. Pendlebury, did not survive to see the completion of the work we began together, under sunnier skies, nearly twenty years ago.

A. STEVEN CORBET

15th September, 1947.

The sudden and premature death of my husband when this work was going to press in May, 1948, laid a heavy burden upon his friends and colleagues at the Natural History Museum, South Kensington, and elsewhere. Despite the heavy demands of their own work many of these friends have found time to perform tasks which would have been so much simpler if the original authors had lived to complete them, and which have been greatly complicated by the delay of more than seven years in publication.

During these years the main responsibility has been shouldered by Mr. N. D. Riley, C.B.E., Keeper of Entomology at the British Museum (Natural History). We have also to thank Mr. R. J. Collins who has made the index; Major C. F. Cowan, R.A., for many valuable criticisms and additional records resulting from recent field work in Malaya, and for a revision, in collaboration with Dr. C. B. Williams, F.R.S., of the mathematical section of the book; Col. J. N. Eliot, R.A., for reading proofs and for a revision of keys to certain Lycaenid genera; Brigadier W. H. Evans, C.S.I., C.I.E., D.S.O., for special help with the family HesperIIDae and the genus *Curetis*; and Mr. Tams and Mr. Gabriel for help with proofs.

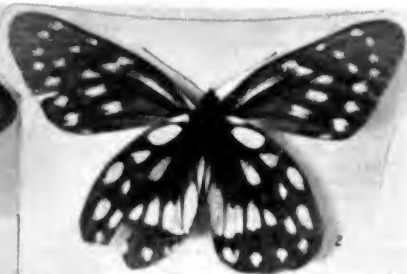
We are indebted also to the Publishers, and to those friends and enthusiasts in Singapore and the Malayan Union through whose good offices the many problems have been met which threatened the completion of a work so dear to both its authors.

Irene Corbet

July, 1955.



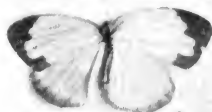
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Chrysippus 767.
51. Chrysippus



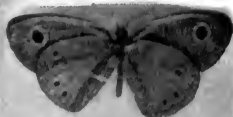
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Hebe 763.
78 Hebe

Similis 762

Similis
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Lara



79. *Miner*



Thrax 776.



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Augias



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1. *Trogonoptera brookiana albescens* Rothschild, ♂.
2. *T. brookiana albescens* Rothschild, ♀.
3. *Papilio memnon agenor* L., ♂.
4. *Troides helena cerberus* (C. and R. Felder), ♂.
5. *T. helena cerberus* (C. and R. Felder), ♀.
6. *Papilio memnon agenor* (L.), ♀-f. *distantianus* Rothschild. (South Burma).

Half natural size.

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7. *Atrophaneura nox crebus* (Wallace), ♀.
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9. *A. aristolochiae asteris* (Rothschild), ♂.
10. *Chilasa clytia clytia* (L.) f. *onpape* Moore, ♀.
11. *C. clytia clytia* (L.) f. *dissimilis* (L.), ♂.
12. *C. paradoxa aenigma* (Wallace) f. *aenigma* (Wallace), ♂.
13. *Papilio demoleus malayanus* Wallace, ♂.
14. *P. demolion demolion* Cramer, ♂.
15. *P. nephelus sumatus* Corbet, ♂.
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17. *Papilio polytes romulus* Cramer, ♂.
18. *P. palinurus palinurus* Fabricius, ♂.
19. *Graphium antiphates itamputi* (Butler), ♂.
20. *G. sarpedon luctatius* (Fruhstorfer), ♂.
21. *G. doson evemonides* (C. and R. Felder), ♂ (underside).
22. *G. agamemnon agamemnon* (L.), ♂.
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26. *Delias hyparete metarete* Butler, ♂ (underside).

Figures 17-20, $\frac{4}{10}$ ths ; 21-26 $\frac{6}{10}$ ths natural size.



27. *Delias ninus ninus* (Wallace), ♀ (underside).
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 37. *Saletara liberia distantis* Butler, ♂.
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PART I

INTRODUCTION

CHAPTER I

THE ADULT BUTTERFLY

THE Animal Kingdom is divided into the *Vertebrata*, which include those animals that possess a skeleton inside the body with a backbone composed of a number of joints or vertebrae (mammals, birds, reptiles, amphibians and fishes), and the *Invertebrata*, which comprise a very much larger number of organisms in which no jointed backbone is present.

The largest division of the *Invertebrata* is the *Arthropoda*, which includes those creatures with paired, segmented legs such as *Crustacea* (crabs, lobsters, etc.), *Arachnida* (scorpions, spiders, etc.), *Myriapoda* (millipedes and centipedes) and *Hexapoda* or *Insecta*. In the *Insecta* the equivalent of a skeleton is formed by the outer covering of the body. This outer covering is composed of chitin and varies greatly in consistency.

In the Class *Insecta* the body consists of three parts: the *head*, which bears a single pair of antennae, the eyes and the mouth parts; the *thorax*, which carries the organs of locomotion; and the *abdomen*, which normally consists of ten segments and contains the organs of digestion and reproduction. The mouth-parts may be of the sucking, lapping, biting, or rasping type, and are provided with palpi, although the function of these latter organs in butterflies is obscure. The locomotory organs on the thorax comprise three pairs of legs and, in the adult in most orders, two pairs of wings. The thorax is divided into the prothorax, which carries the first pair of legs, the mesothorax, to which is attached the middle pair of legs and the forewings, and the metathorax, which bears the hind pair of legs and the hindwings. Usually, on each of the abdominal segments 1 to 7 there is present a pair of spiracles, which are apertures of the respiratory system.

Orders of Insects

The twenty-four Orders of insects generally recognised are divided into two sub-classes, the first of which includes the primitive wingless orders which are derived from wingless ancestors. In these metamorphosis (change in form during life) is absent or slight. The second sub-class, in two divisions, includes forms which are winged in the adult state.



40. *Valeria valeria lutescens* (Butler), ♂.

41. *Catopsilia pyranthe pyranthe* (L.), ♂.

42. *C. pomona pomona* (F.), ♂-f. *alceone* (Cramer).

43. *C. pomona pomona* (F.), ♀-f. *pomona* (Fabricius).

44. *C. scylla cornelia* (Fabricius), ♂.

45. *Eurema hecabe contubernalis* (Moore), ♂.

46. *E. lacteola lacteola* (Distant), ♂.

47. *Gandaca harina distant* Moore, ♂.

48. *Danaus chrysippus alcippoides* (Moore), ♀.

49. *D. genutia intermedia* (Moore), ♂.

50. *Danaus aspasia aspasia* (Fabricius), ♀.

51. *D. agleoides agleoides* (C. and R. Felder), ♂.

52. *D. vulgaris macrina* (Fruhstorfer), ♀.

Figures 40-43 1/3th; 44-52 1/2th natural size.

The first division contains orders in which metamorphosis is incomplete, no pupal, or chrysalis stage occurring, and the immature (nymphal) forms usually bear some resemblance to the adult. The second division in this sub-class consists of the more highly developed and specialised orders in which metamorphosis is complete and often complex. The following system is that given by Imms (1925), except that the Zeugloptera have been separated from the Lepidoptera. No representatives of the second order (Protura) have yet been found in Malaya.

Sub-class I. *APTERYGOTA* (Wingless)

Order 1. THYSANURA (Silver-fish and bristle-tails)

2. PROTURA

3. COLLEMBOLA (Spring-tails)

Sub-class II. *PTERYGOTA* (Winged)

Division I. *Exopterygota*

Wings developed externally. Metamorphosis slight and incomplete. The larval forms, known as nymphs, usually bear some resemblance to the adult forms.

Order 4. ORTHOPTERA (Cockroaches, stick insects and grasshoppers)

5. DERMAPTERA (Earwigs)

6. PLECOPTERA (Stone flies)

7. ISOPTERA (Termites, or white ants)

8. EMBIOPTERA

9. PSOCOPTERA (Book lice)

10. ANOPLURA (Bird lice and sucking lice)

11. EPHEMEROPTERA (May flies)

12. ODONATA (Dragon flies)

13. THYSANOPTERA (Thrips)

14. HEMIPTERA (Plant bugs, cicadas, etc.)

Division II. *Endopterygota*

Wings developed internally. Metamorphosis complete : egg (ovum) → caterpillar or grub (larva) → chrysalis (pupa) → adult or perfect insect (imago).

Order 15. NEUROPTERA (Lacewings, ant lions, etc.)

16. MECOPTERA (Scorpion flies)

17. ZEUGLOPTERA (Micropteryx)

18. TRICHOPTERA (Caddis flies)

19. LEPIDOPTERA (Butterflies and moths)

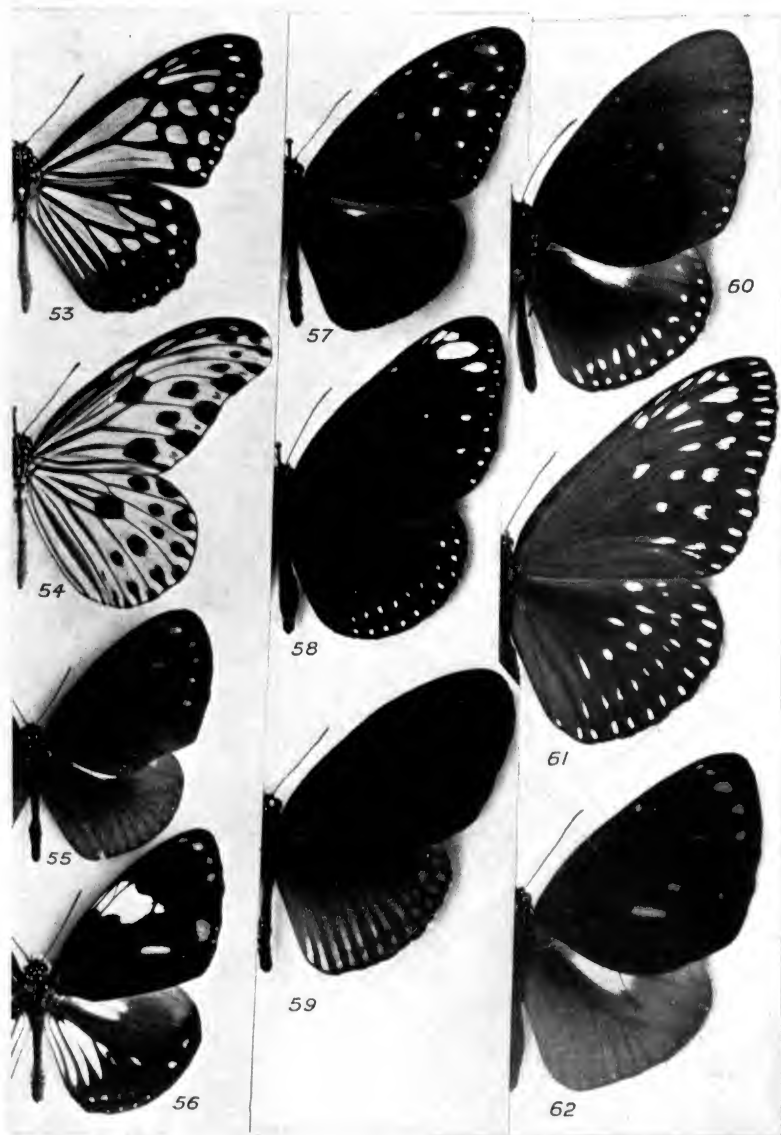
20. COLEOPTERA (Beetles)

21. STREPSIPTERA (Stylops)

22. HYMENOPTERA (Ants, bees and wasps)

23. DIPTERA (Two-winged flies)

24. APHANIPTERA (Fleas)



53. *Danaus melaneus sinopion* (Fruhstorfer), ♂.
 54. *Ideopsis gaura perakana* Fruhstorfer, ♂.
 55. *Euploea tulliolus ledereri* C. and R. Felder, ♂.
 56. *E. diocletianus diocletianus* (Fabricius), ♂.
 57. *E. mulciber mulciber* (Cramer), ♂.
 58. *E. crameri bremeri* C. and R. Felder, ♂.
 59. *E. cyndhovi gardineri* Fruhstorfer, ♂.
 60. *E. midamus chloe* (Guérin), ♂.
 61. *E. redtenbacheri malayica* (Butler), ♀.
 62. *E. leucostictos leucogonis* (Butler), ♂.

Figures 53-59, $\frac{1}{8}$ ths ; 60-62 $\frac{1}{5}$ ths natural size.

The Anoplura and Aphaniptera, which contain species parasitic externally upon warm-blooded animals, are included in the Pterygota in spite of their wingless state as they are derived from winged ancestral forms. Their present apterous condition is secondary and due to specialisation.

Each of the orders is divided into families, subfamilies, genera and species, and a species may be divisible into geographical races or subspecies (see pages 20-23).

Distinguishing Characters of Butterflies

It will be seen from the above list that butterflies and moths comprise the Order Lepidoptera. Hitherto, it has been customary to divide the Order into two main divisions :—

HOMONEURA, in which the venation of both wings is similar. The families Micropterygidae, Eriocraniidae and Hepialidae formerly constituted this division, but the first-named has been raised to ordinal rank (Order Zeugloptera), and, on account of the primitive pupa, the Eriocraniidae have been placed in a new suborder Dacnonypha (Hinton, 1946).

HETERONEURA, in which the venation of the forewing and hindwing is different, the hindwing having fewer veins. This division comprises the remainder of the lepidopterous families.

According to the arrangement proposed by Hinton, the Order Lepidoptera is divided into three suborders :—

I. **DACNONYPHA**, which differs from the following suborder essentially in the primitive pupa.

II. **MONOTRYSLA**, in which the adult female has a single genital opening, and comprising a few families of moths such as Hepialidae, and the leaf-miners Nepticulidae and Incurvariidae.

III. **DITRYSLA**, in which the adult female has two genital openings, and comprising the remainder of the Lepidoptera.

It is convenient to group together the families of butterflies under the name **RHOPALOCERA**. One of the best guides for differentiating butterflies from moths is the antennal characters. In butterflies the antennae are thread-like (*filiform*), and are definitely clubbed or thickened gradually towards the tip ; they are always held erect and never folded under the wings. Another good character is the *amplexiform* wing-coupling mechanism, in which the hindwing is held in position by upward pressure against the stiff basal portion of the forewing. In butterflies the two wings are capable of individual movement, but in moths near the base of the upperside of the hindwing there is usually a bristle (or bunch of bristles), known as the *frenulum*, which fits into a small pocket (*retinaculum*) on the underside of the forewing. With the *frenate* coupling found in moths the wings are kept rigid. On the hindwing there is present in all butterflies, except the Coliadinae and



63. *Idea lynceus lynceus* (Drury), ♂.
 64. *Neorina lowii neophyta* Fruhstorfer, ♂.
 65. *Ypthima pandocus corticaria* Butler, ♂ (underside).
 66. *Erites angularis angularis* Moore, ♂ (underside).
 67. *Mycalesis janardana sagittigera* Fruhstorfer, ♂ (underside).
 68. *M. mineus macromalayana* Fruhstorfer, ♀ (underside).
 69. *M. fuscum fuscum* (C. and R. Felder), ♀ (underside).
 70. *Lethe europa malaya* Corbet, ♀.
 71. *Mycalesis anaxias bisaltia* Fruhstorfer, ♂ (underside).
 72. *Orsotriaena medus cinerea* (Butler), ♂ (underside).
 73. *Ragadia makuta siponta* Fruhstorfer, ♂ (underside).

Figures 63, 64, $\frac{1}{4}$ ths ; 65-73, $\frac{1}{10}$ ths natural size.

Lycaenidae, a small spur known as the *humeral*, or *precostal vein* ; it is present in very few moths.

Most butterflies fly by day, and, when at rest, they sit with the wings closed in an upright position above the body so that only the underside is visible (this does not apply, of course, when butterflies settle to sun themselves). On the other hand, moths hold their wings when at rest so that the upper surface of the forewings is usually exposed. There are exceptions to these generalisations, but only a short acquaintance with butterflies is necessary before they can be distinguished at sight, and, in cases of doubt, the presence of clubbed or gradually thickened antennae and the absence of a frenulum at the base of the hindwing should decide the issue.

External Anatomy of Butterflies

THE HEAD carries a pair of long, segmented antennae situated in front of, or between, the compound eyes, and a long, coiled, sucking-tube, the proboscis or haustellum, which arises between the paired labial palpi.

The antennal shaft thickens abruptly or gradually to a more or less distinct club at the distal end. The club gradually narrows towards the tip, which may be rounded or pointed. In the Hesperiidae, the club is often distinctly bent at about the middle.

The compound eyes are large and immobile, and may be smooth or hairy. They are composed of a large number of facets, or corneal lenses, each of which represents a separate eye-element, or *ommatidium*, connected by a nerve to the optic nerve centre. In spite of their intricate structure, they are known to constitute a much less perfect optical instrument than the vertebrate eye, as no focusing apparatus exists, and the eyes are only capable of image formation within a very limited range.

The *proboscis*, or tongue, is extended when the butterfly is feeding, but is otherwise kept tightly coiled up like a watch spring.

The *labial palpi* are three-segmented, the basal segment being short and inconspicuous, while the second and third segments are much larger and show sufficient diversity in form and scaling to be of considerable value in classification. The palpi may be porrect (that is, projecting horizontally in front of the head), or erect.

THE THORAX carries the organs of locomotion (as mentioned above, page 1), and, in butterflies, two pairs of wings and three pairs of legs are always present.

The wings are membranous, with veins or nervures running longitudinally from the base to the wing margins. The pattern formed by these veins (wing venation) is of primary importance in the classification of Lepidoptera. The scales with which the wings are clothed are arranged like tiles on a roof, each scale attached to a tiny socket in the wing membrane.

VENATION. The anterior or upper margin of the wing is termed the *costa*, the outer or distal margin remote from the thorax is the *termin*,



74. *Melanitis leda leda* (L.), ♀.
 75. *Elymnias hypermnestra beatrice* Fruhstorfer, ♂.
 76. *E. hypermnestra tinctoria* Moore, ♀
 77. *E. panthera panthera* (Fabricius), ♀.
 78. *Faunis canens arcesilas* Stichel, ♀ (underside).
 79. *Thaumantis noureddin noureddin* Westwood, ♂.
 80. *Amathusia gunneryi* Corbet and Pendlebury, ♀ (underside).
 81. *A. phidippus chersias* Fruhstorfer, ♂ (underside).
 82. *Zeuxidia amethystus amethystus* Butler, ♂.

Figures 74-79, $\frac{3}{4}$ ths ; 80-82, $\frac{2}{3}$ rds natural size.

and the lower or inner margin of the wing is the *dorsum*. The anterior tip of the wing is the *apex*, and the angle formed by the termen and the dorsum is the *torus*. The prefix *sub-* implies "near to," and the lines or markings on a wing may be described as basal, subbasal, costal, subcostal, median or discal, post-median or post-discal, submarginal, marginal, apical, subapical, tornal, subtornal, dorsal and so forth.

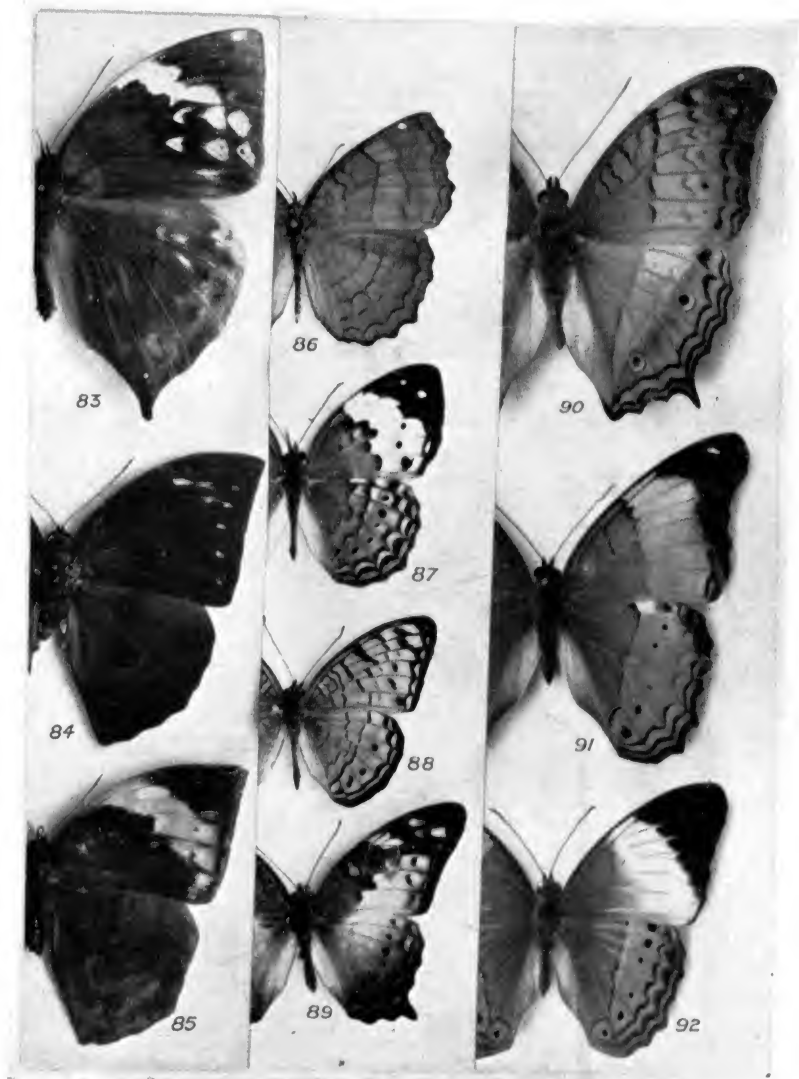
On each wing is a comparatively wide and approximately triangular space, with its apex at the base of the wing, termed the *discal* or *discoidal cell* or, simply, the cell. The cell is normally closed at the outer end by short transverse veinlets known as *discoidal* or *discocellular veins*. The portion of the wing surface surrounding the discoidals is usually termed the *discal area*. Usually, on the forewing, ten veins arise from the cell, or from veins arising from the cell, while six veins have their origin in this way on the hindwing.

There are several systems of venational nomenclature in vogue, of which that of Comstock (1918) is the most important as it is applicable to all orders of insects. In a work such as the present, where venational

VENATIONAL NOMENCLATURE ACCORDING TO THE COMSTOCK AND THE NUMERICAL SYSTEMS				
Vein	Forewing		Hindwing	
	Comstock Notation	Numerical Notation	Comstock Notation	Numerical Notation
Subcosta	Sc	12	} Sc + R ₁	8
Radius	R ₁	11		
Radial Sector ..	R _s	—	Rs	7
First Branch ..	R ₂	10	—	—
Second Branch ..	R ₃	9	—	—
Third Branch ..	R ₄	8	—	—
Fourth Branch ..	R ₅	7	—	—
Median	M	—	—	—
First Branch ..	M ₁	6	M ₁	6
Second Branch ..	M ₂	5	M ₂	5
Third Branch ..	M ₃	4	M ₃	4
First Cubitus ..	Cu ₁		Cu ₁	
Upper Branch ..	Cu _{1a}	3	Cu _{1a}	3
Lower Branch ..	Cu _{1b}	2	Cu _{1b}	2
Second Cubitus ..	Cu ₂	1c	Cu ₂	1c
First Anal	1A	} 1b	1A	} 1b
Second Anal ..	2A		2A	
Third Anal	3A		3A	

In *Rhopalocera* vein 1a is normally absent from the forewing while vein 1c is absent from both wings.

nomenclature is used for the limited purpose of describing and identifying butterflies, it appears desirable to employ the English numerical system and this has been done. In the appended table, the nomenclature of the veins according to the two systems is given in parallel columns: the Comstock Notation is as modified by Tillyard (1926).



83. *Zeuxidia amethystus amethystus* Butler, ♀. (West Sumatra).
 84. *Discophora timora perakensis* Stichel, ♂. (Perak, Tanjong Malim, 1886, H. Kunstler).
 85. *D. timora perakensis* Stichel, ♀. (Perak, Kinta, 1884, H. Kunstler).
 86. *Ariadne ariadne ariadne* (L.), ♂. (Malaya, 1904, J. Waterstradt).
 87. *Cupha erymanthis lotis* (Sulzee), ♂.
 88. *Phalanta alcippe alcesta* Corbet, ♂.
 89. *Vagrans egista macromalayana* (Fruhstorfer), ♀.
 90. *Vindula arsine erotella* (Butler), ♂.
 91. *Cirrochroa emalea emalea* (Guérin), ♀.
 92. *C. orissa orissa* C. and R. Felder, ♂.

Figures 83-85, ♂♂s natural size ; 86-92 slightly reduced.

In the Numerical Notation the veins are numbered from the dorsum to the costa so that the veins run from vein 1a or 1b to vein 12 on the forewing and from vein 1a to vein 8 on the hindwing. Veins 2 to 11 on the forewing and veins 2 to 7 on the hindwing emanate from the margins of the discoidal cell (or from veins arising from the cell) while the remaining veins originate from the wing bases.

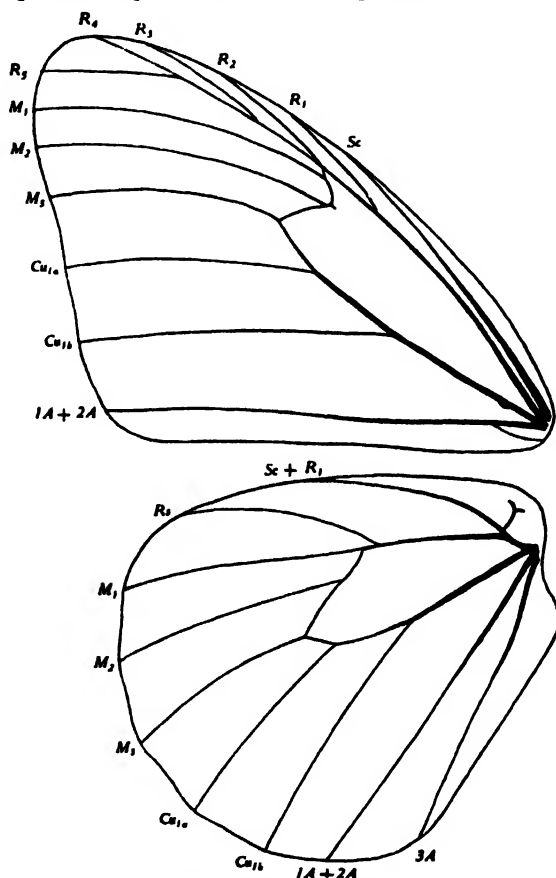


Fig. 1. *Danaus genutia*. Venation according to the Cornstock System

In the Hesperiiidae, all veins on both wings are unbranched and run straight to the costal or distal margins. In all other families, however, two or more of the veins arising from the cell are branched or coincident and, in such cases, the common vein before the bifurcation bears the number of the lower vein. Thus, in fig. 2 vein 8 on the forewing arises from vein 7, and not vein 7 from vein 8. In most species of Pieridae and



93. *Terinos clarissa malayana* Fruhstorfer, ♂ (underside).
 94. *Cethosia hypsea hypsina* C. and R. Felder, ♂.
 95. *C. penthesilea methypsea* Butler, ♀ (underside).
 96. *Precis iphita horsfieldi* (Moore), ♂.
 97. *P. atlites atlites* (L.), ♀.
 98. *P. orithya wallacei* (Distant), ♂.
 99. *P. almana javana* (C. Felder), ♂.
 100. *Vanessa cardui cardui* (L.), ♀. (England).
 101. *Polygonia canace perakana* (Distant), ♀.
 102. *Symbrenthia hypatia chersonesia* Fruhstorfer, ♂ (underside).
 103. *Rhinopalpa polynice eudoxia* (Guérin), ♂.

Figures 93-99 ; natural size ; 100-103 ; $\frac{2}{3}$ ths natural size.

Lycaenidae, one or more veins are missing from the forewing, and it is not always easy to decide which veins are absent. The veins at the apex of the forewing show the greatest variability, and it is usually assumed that any reduction in venation has been effected by the disappearance first of vein 8 and then of vein 9. For the purpose of ease of recognition of the venational systems, this assumption is made throughout the present work,

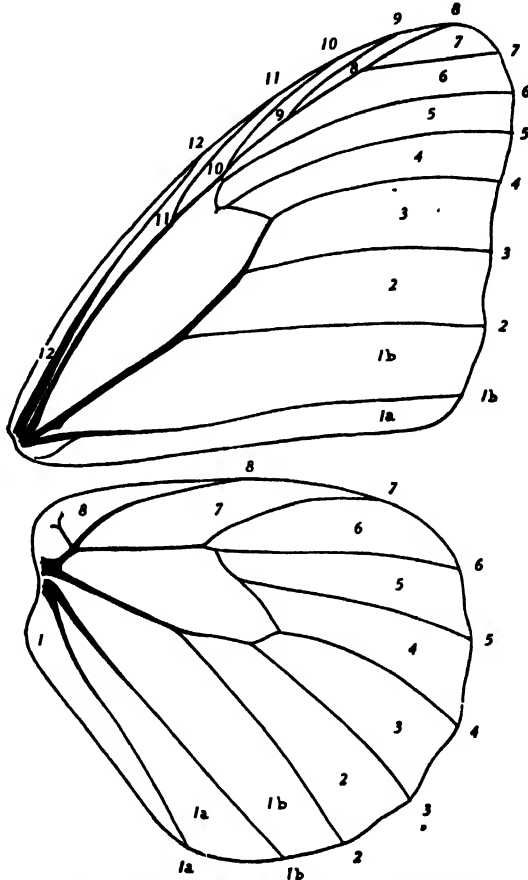
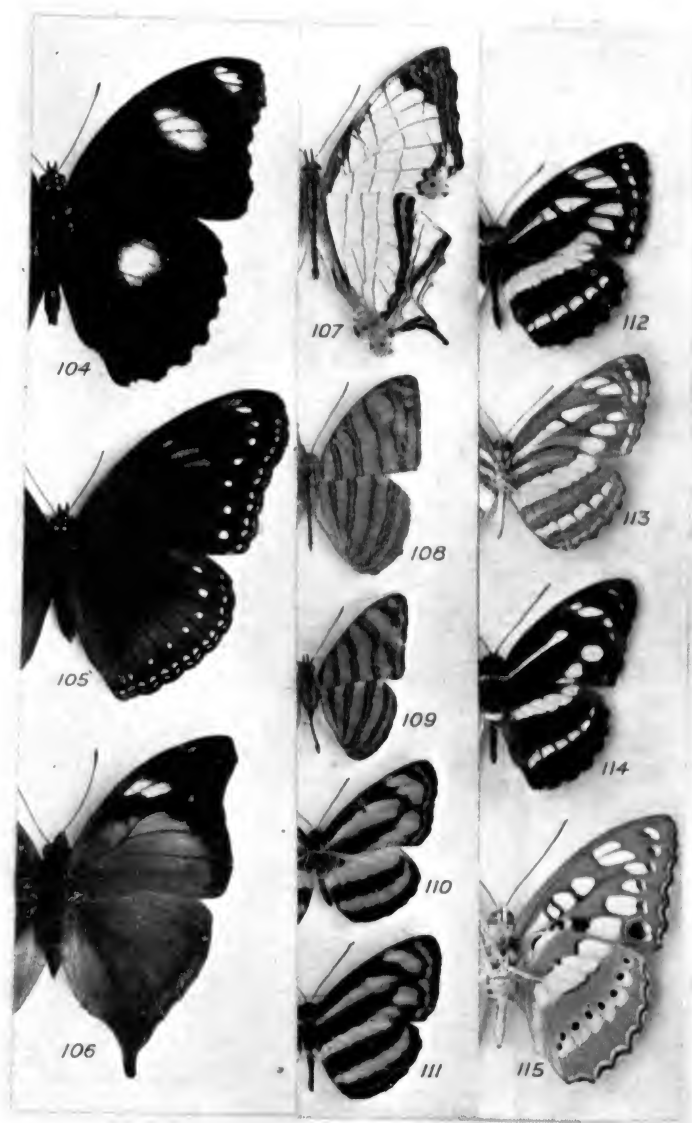


Fig. 2. *Danaus genutia*. Venation according to the numerical notation.

but it is not certain that such is invariably the case. By a study of the tracheation of the forewing in the pupae of some British butterflies, Zeuner (1943b) has shown that, at least in some species of Pieridae, it is one of the median veins (probably vein 5) and not one of the radial veins (such as vein 8 or 9) which is missing. On the other hand, there is evidence suggesting that it is vein 9 which is absent in some species of Lycaenidae.



- | | |
|---|--|
| 104. <i>Hypolimnas bolina bolina</i> (L.), ♂. | 110. <i>Neptis hordonia hordonia</i> (Stoll), ♂. |
| 105. <i>H. antilope anomala</i> (Wallace), f.
<i>anomala</i> (Wallace), ♂. | 111. <i>N. heliodore dorelia</i> Butler, ♀. |
| 106. <i>Dolichsalpia bisaltide pratipa</i> C. and R.
Felder, ♂. | 112. <i>N. hylas mamaja</i> Butler, ♂. |
| 107. <i>Cyrestis nivea nivalis</i> C. and R.
Felder, ♂. | 113. <i>N. hylas mamaja</i> Butler, ♂ (under-
side). |
| 108. <i>Chersonesia rahria rahria</i> (Moore), ♂. | 114. <i>Parathyma pravara kelma</i> (Fruhstorfer),
♂. |
| 109. <i>C. intermedia</i> Martin, ♂. | 115. <i>P. perius perius</i> (L.), ♂ (underside). |

Figures 104-106, $\frac{1}{2}$ ths natural size ; remainder, natural size.

In the *Hesperiidae*, vein 5 on the hindwing is rarely present as a tubular vein and is usually indicated by a fold in the wing ; sometimes it is untraceable.

The *interspace* between two veins is known by the number of the lower vein ; for example, the interspace between veins 5 and 6 is space 5. Where vein 1a is present, the space between that vein and the dorsal margin of the wing is referred to as space 1 in the present work ; the interspace between veins 1a and 1b is called space 1a, and that between veins 1b and 2 is termed space 1b. In fig. 2 the vein numbers are given at the vein endings and the interspace numbers between the veins.

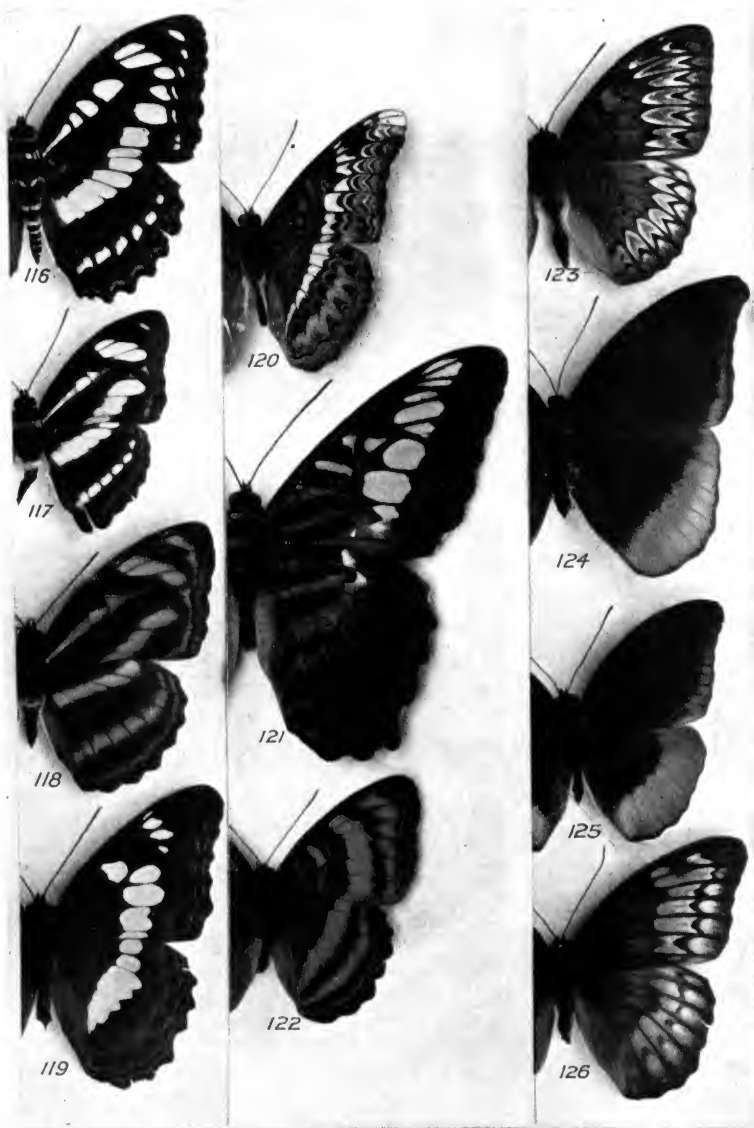
In many butterfly books, the upper and lower margins of the cell are termed the subcostal and median (or submedian) veins respectively, but this application of the terms is not correct, and we call them the *radius* and *cubitus* in accordance with the Comstock System. The radius is considered here as running from the wing base to the origin of vein 7 (or of vein 6 when veins 6 and 7 are stalked), while the cubitus is regarded as extending from the wing base to the origin of vein 4 : the *lower discocellular vein* is the cross vein joining the origins of veins 4 and 5, the *middle discocellular vein* is the cross vein joining veins 5 and 6, while the *upper discocellular vein* is the short vein joining veins 6 and 7, and is often obsolete. In most families of butterflies, there is a small vein, or at least a trace of such a vein, arising from near the base of vein 8 on the hindwing and this is termed the *precostal* or, more correctly, the *humeral vein*.

A study of the wing venation in butterflies is often a necessary preliminary to their identification. As a rule the disposition of the veins is better seen from the underside after touching the surface of both wings with a small camel's hair brush dipped in benzene, toluene or xylene. This treatment causes the scales to lie flat and the veins to stand out, and the liquid evaporates rapidly without damage to the wing membrane. In counting the veins, it is a useful plan to start from vein 2 (the lowest vein arising from the cell) and to count upwards towards the costa.

At the base of the forewing is a long, lappet-like structure, the *tegula*, which is attached to the mesothorax.

LEGS. Each leg consists of five parts, the *coxa* (or hip) by which it is articulated to the thorax, the *trochanter*, the *femur* (or thigh), the *tibia* (or shank) and the *tarsus* (or foot). Often the tibia is armed with one or two pairs of movable spurs and is usually fringed with hair. The tarsus is five-segmented and the terminal segment ends in a pair of claws, which are bifid in the *Pieridæ*. Beneath the tarsal claws a small pad termed the *pulvillus* is normally present, and adjacent to each claw is a brush-like attachment known as the *paronychium*.

The legs are of major importance in the classification of *Rhopalocera*. In some families the fore-legs are short, slender and not fully developed,



116. *Parathyma perius perius* (L.), ♂.

117. *P. nefte subrata* (Moore), ♂.

118. *P. nefte subrata* (Moore), ♀-f. *subrata* (Moore).

119. *Moduza procris milonia* (Fruhstorfer), ♀.

120. *Lebadea martha malayana* Fruhstorfer ♂.

121. *Parthenos sylvia lilacinus* Butler, ♂.

122. *Pandita sinope sinope* Moore, ♂.

123. *Tanarctia pelea pelea* (Fabricius), ♂.

124. *Euthalia lepidea matala* (Fruhstorfer), ♀.

125. *E. iapis puseda* (Moore), ♂.

126. *E. iapis puseda* (Moore), ♀.

Figures 123-126 $\frac{1}{2}$ ths natural size.

and this is particularly the case in the male, where the tarsus may be brush-like and useless for walking, as in the Nymphalid group of families, or reduced to a single segment and armed with a single claw as in the Lycaenidae.

Most species of butterflies have a pair of spurs at the distal end of the hind tibiae ; in all the Hesperidae there is also a pair of spurs on the mid tibiae and, usually, a second pair on the hind tibiae.

MALE SECONDARY SEXUAL CHARACTERS. In the male of many species of Rhopalocera there are present, on one or more of the wing surfaces, or on the abdomen or legs, certain modifications in the structure whose function is to disseminate scent during courtship. These secondary sexual characters may comprise :

(a) Plume- or fan-shaped *androconial* or *scent scales*, which are distributed at random in the discal area on the upperside of both wings or confined to a few restricted areas, such as along the veins in the discal area. These androconia are most pronounced in the Pieridae and Lycaenidae, although they occur to a much lesser extent in the Satyridae and Amathusiidae.

(b) *Brands* or *stigmata*, comprising raised patches or streaks of specialised scales on the upperside of the forewing and hindwing, and, more rarely, on the dorsal area of the forewing beneath. Overlying the brand may be an erectile hair tuft which can be opened fan-wise to act as a scent distributor.

(c) Recumbent or erectile *hair tufts* may be present on the wing surfaces (other than the underside of the hindwing), and, frequently, a hair pencil on the dorsal area of the underside of the forewing is associated with a brand in the costal area on the hindwing above. Recumbent or erectile hair tufts are present on the abdomen in some genera, and, in the Coeliadinae and Pyrginae, such tufts may be present on the legs.

(d) In the Coeliadinae and Pyrginae, the male may have a *costal fold*, containing specialised scales, and situated along the costal margin of the forewing above. When closed, this fold may not be immediately apparent. In some species, and as is often the case with other male secondary sexual characters, this costal fold may be present or absent in individuals or according to locality.

(e) Portions of the veins on either wing may be swollen in the male : examples are found in *Cirrochroa*, in Miletinae and in many species of Hesperidae, notably *Zographetus* and *Zela*.

(f) It is not unusual for the veins to be distorted in the vicinity of a brand, and, in a few genera of Hesperinae such as *Ampittia* and *Halpe*, veins 6 and 7 on the hindwing are "hair-pinned." In *Bibasis oedipodea*, the hindwing costa is folded and vein 8 is distorted.

(g) Pockets or pouches containing scent wool or other odoriferous material (Papilionidae), or extrusible hair tufts.



127. *Euthalia monina monina* (Fabricius), ♂.
128. *E. monina monina* (Fabricius), ♀.
129. *E. aconthea gorda* Fruhstorfer, ♂.
130. *E. evelina compta* Fruhstorfer, ♂.
131. *E. dirtea dirteana* Corbet, ♂.
132. *Euthalia dirtea dirteana* Corbet, ♀.
133. *Hestina nama ruwanella* Fruhstorfer, ♂.
134. *Prothoe calydonia calydonia* (Hewitson), ♂.
135. *Kallima paralekta amplirufa* Fruhstorfer, ♂.
136. *Idrusia nyctelius euploeoides* (C. and R. Felder), ♂.

All figures $\frac{1}{4}$ ths natural size.

(h) The costal margin of the forewing is serrate in the male of *Prioneris* and *Charaxes*.

(i) In some groups of Lepidoptera, and notably in the Danaidae, the male has one or two pairs of extrusible hair pencils at the end of the abdomen. These pencils are often seen opened fan-wise during flight, and the peculiar scents thus disseminated by some species of *Danaus* and *Euploea* are well known to collectors of Oriental butterflies.

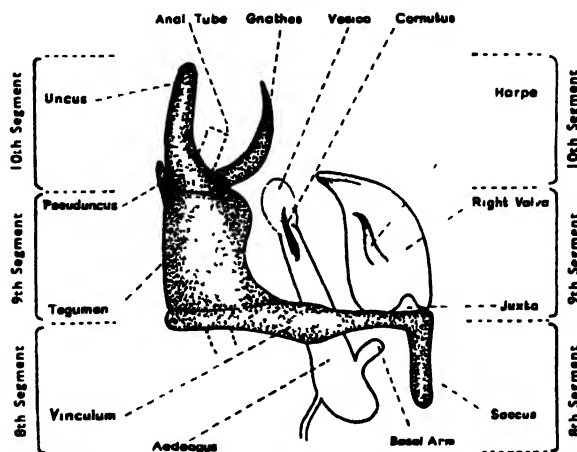
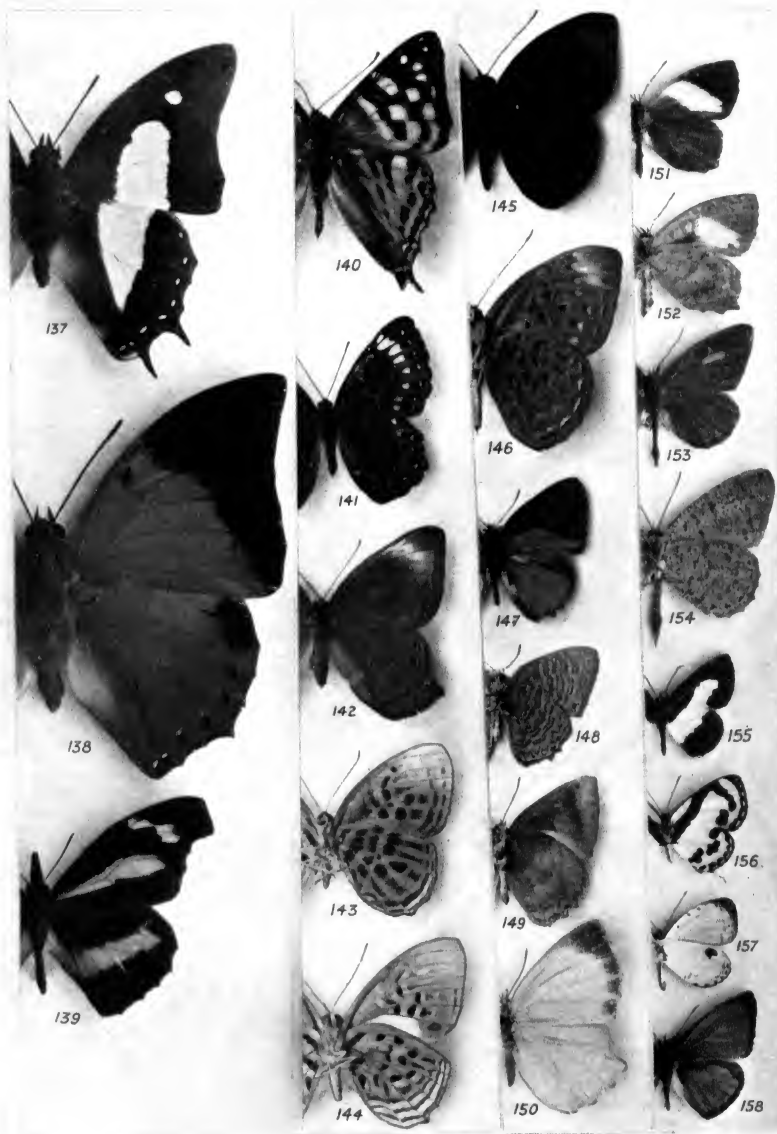


Fig. 3. Male genitalia of a butterfly (Diagrammatic).

The development of secondary sexual characters in the female is much less usual. In some species of Pieridae the female has a weak pecten of hairs along the dorsal margin on the hindwing above, making contact with a pad of specialised scales on the underside of the abdomen. In the Hesperiid genus *Tagiades* the female has a dense tuft of short hairs at the end of the abdomen.

MALE AND FEMALE GENITALIA. The male genital apparatus comprises the strongly sclerotised and modified IXth, Xth and XIth abdominal segments, and consists, essentially, of the intromittent organ, the *aedeagus* (corresponding to the penis), which usually lies between the paired, ventral, laminate *valvae*, or claspers, which are often armed with hooks or similar processes, and whose function is believed to be to clasp the female abdomen during copulation.

The stout dorsal *tegumen* is distally fused with the *uncus*, and, arising from the ventral side of the junction of these organs, is the *gnathos*, which is frequently bifid, and in some families (notably the Pieridae and Lycaenidae), consists of a pair of hooks—the so-called *dorsal hooks*. In some groups, the *gnathos* is absent. The *tegumen* is fused with the ring-like *vinculum*, which is ventrally extended to form a bulbous structure



137. *Polyura athamas samatha* (Moore), ♂.
 138. *Charaxes polyxena crepax* Fruhstorfer, ♂.
 139. *Libythea myrrha hecure* Fruhstorfer, ♂.
 140. *Dodona egeon egeon* (Westwood), ♂.
 (Burma: the Malayan race, *confluens* Corbet has the forewing spots more confluent.)
 141. *Zemeros flegyas albipunctata* Butler, ♀.
 142. *Abisara saturata kausambioides* Nicéville, ♀.
 143. *Laxita damajanti damajanti* (C. and R. Felder), ♂ (underside).
 144. *L. telesia lyclene* Nicéville, ♂ (underside).
 145. *Taxila haquinus haquinus* (Fabricius), ♂.
 146. *T. haquinus haquinus* (Fabricius), ♂ (underside).
 147. *Poritia sumatrae sumatrae* (C. and R. Felder), ♂.
 148. *P. sumatrae sumatrae* (C. and R. Felder), ♂ (underside).
 149. *Simiskina phalia potina* (Hewitson), ♂ (underside). (South Burma).
 150. *S. phalia potina* (Hewitson), ♀. (South Burma).
 151. *Miletus biggsii biggsii* (Distant), ♀.
 152. *M. biggsii biggsii* (Distant), ♀ (underside).
 153. *Allotinus unicolor unicolor* C. and R. Felder, ♂.
 154. *A. horsfieldi vadosus* Corbet, ♂ (underside).
 155. *Castalius roxus pothus* Fruhstorfer, ♂.
 156. *C. roxus pothus* Fruhstorfer, ♀ (underside).
 157. *Pithecopus corvus corvus* Fruhstorfer, ♂ (underside).
 158. *Celastrina puspa lambi* (Distant), ♂.

Figures 145-158 slightly reduced.

termed the *saccus*. Usually, in the Rhopalocera, the vinculum appears to form a complete ring around the abdomen. The paired valvae may be fixed to the vinculum or attached to a small ventral plate termed the *juxta*. The dorsal edge of the valva is known as the *costa*, and the ventral edge is often strongly chitinised. In some forms, there projects dorsally from the valva a tapered or hook-like arm, the *harpe*.

The distal portion of the aedeagus contains an eversible, sac-like, membranous component termed the *vesica*, which may be studded with chitinised spines or plates (the *cornuti*), and the shape and arrangement of these is often of diagnostic significance. The vesica is normally found retracted, so that the cornuti lie within the lumen of the aedeagus.

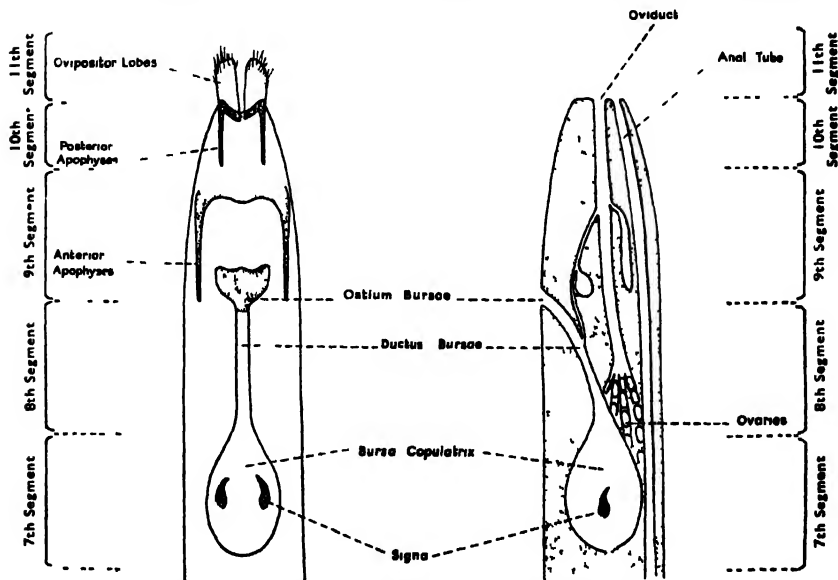


Fig. 4. Female genitalia of a butterfly (Diagrammatic).

The membranous *anal tube* is situated between the uncus and the gnathos, and it is usually destroyed when preparations entail a preliminary boiling in caustic alkali. Often, some of the sclerotised portions of the male genitalia are clothed with hair-scales, but, except when their presence is very pronounced or of diagnostic importance, these have been omitted from the genitalia diagrams in this book.

In some groups of Oriental Rhopalocera the male genitalia show unusual features. For example, there is a *pseuduncus* (a process projecting from the dorsal edge of the tegumen) in *Catopsilia*, and, in this genus as well as in others of the Coliadinae, there is a basal arm to the aedeagus. In some species of Papilionidae and in Libytheidae a *superuncus* is present. The much reduced uncus and tegumen are characteristic of the Danaidae.



159. *Celastrina puspa lambi* (Distant), ♂ (underside). 160. *C. puspa lambi* (Distant), ♀, ♂ (underside). 161. *C. dilectus briga* (Fruhstorfer), ♂ (underside). 162. *Zizula hylax pygmaea* (Snellen), ♂ (underside). 163. *Zizeeria knysna karsandra* (Moore), ♀ (underside) (Assam). 164. *Euchrysops cnejus cnejus* (Fabricius), ♀ (underside). 165. *Anthene emolus goberus* (Fruhstorfer), ♂ (underside). 166. *Catochrysops panormus exiguus* (Distant), ♂ (underside). 167. *Lampides boeticus* (L.), ♂ (underside). 168. *Jamides celeno aelianus* (Fabricius), ♂ (underside). 169. *J. celeno aelianus* (Fabricius), ♀ (underside). 170. *J. celeno aelianus* (Fabricius), ♂ (underside). 171. *Una usta usta* (Distant), ♂ (underside). 172. *Nacaduba subperusia lysa* Fruhstorfer, ♂ (underside). 173. *N. beremice icena* Fruhstorfer, ♂ (underside). 174. *N. helicon merguiana* Moore, ♀ (underside). 175. *N. nora superdates* Fruhstorfer, ♂ (underside). 176. *Heliophorus epicles indicus* (Fruhstorfer), ♂ (underside). 177. *Curetis santana malayica* (C. and R. Felder), ♂ (underside). 178. *C. bulis bulis* (Westwood), ♂ (underside). 179. *Arhopala aedias agnis* C. and R. Felder, ♀ (underside). 180. *A. atosia malayana* Bethune Baker, ♂ (underside). 181. *A. eumolpus maxwelli* (Distant), ♂ (underside). 182. *Surcudra vivarna amisenae* (Hewitson), ♂ (underside). 183. *Loxura atymnus fuconius* Fruhstorfer, ♂ (underside). 184. *Yasoda pita doherlyi* Fruhstorfer, ♀ (underside). 185. *Spindasis lohita senama* (Fruhstorfer), ♀ (underside). 186. *Pratapa vidura sinhara* (Fruhstorfer), ♂ (underside).

All figures slightly reduced.

The male genitalia figured on plates 2 to 21 have been selected, in the first place, to give an idea of the variation in the form of these parts throughout the Rhopalocera, and, secondly, to show precisely the differences in genitalia between species whose separation is difficult on superficial characters.

In butterflies, as in all families of Ditrysia, the adult female has two genital openings. The opening of the oviduct and anus is situated at the extreme end of the abdomen on the Xth segment, and the entrance to the bursa copulatrix lies on the ventral side of the VIIIth segment. The first is concerned with oviposition and excretion, and the second with copulation.

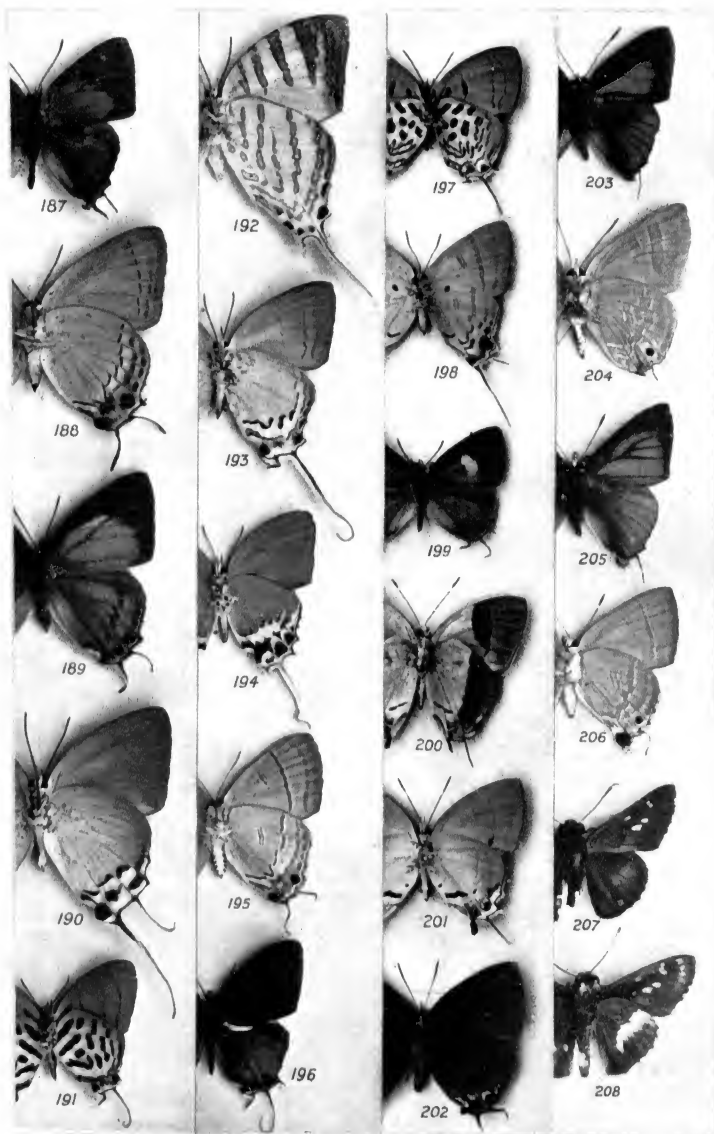
Covering the opening of the oviduct are a pair of prominent, slightly sclerotised, hairy lobes, the *ovipositor lobes*, whose shape is characteristic of the genus or subfamily to which the species pertains. Each lobe is continued anteriorly as a sclerotised rod, and the VIIIth segment carries a further pair of such rods; these are termed the *posterior apophyses* and the *anterior apophyses* respectively.

The *bursa copulatrix* is a large, membranous sac which accommodates the everted vesica of the male during copulation, and is connected with the *ostium bursae* (or opening of the bursa), by means of a tube, the *ductus bursae*, which may differ markedly in width and length from one species to another. In some species, the bursa copulatrix has sclerotised areas on the walls; these are known as *signa* (singular *signum*) and may take the form of spines, teeth or a plate.

Sometimes the bursa copulatrix is found distended as a result of the presence of one or more flask-shaped capsules. These are the *spermatophores* which enclose the spermatozoa, introduced into the ostium bursae by the male.

The shape and structure of the bursa copulatrix and the ostium bursae, and, to a lesser extent, of the ovipositor lobes, are often of considerable diagnostic value. It is probable that the spermatophores are also important in this connection, but they have been little studied. In general, however, the female genitalia show less tendency towards specific differentiation than do those of the male, and their study entails greater precision and more experience. For these reasons, little progress has been made towards a comprehensive investigation of the female genitalia of Oriental Lepidoptera, and, until this is done, it will not be possible to identify with certainty some of the females of such genera as *Jamides*, *Potanthus*, etc.

(Basic literature: Beirne, 1942a, 1942b.)



187. *Pratapa deva relata* (Distant), ♂ (South Burma). 188. *P. cippus maxentius* (Fruhstorfer), ♀ (underside). 189. *P. cippus maxentius* (Fruhstorfer), ♀. 190. *Jacoonia amrita amrita* (C. and R. Felder), ♀ (underside). 191. *Marmessus ravindra moorei* (Distant), ♂ (underside). 192. *Neomyrina nivea periculosa* Fruhstorfer, ♀ (uns.). 193. *Cheritra freja frigga* Fruhstorfer, ♀ (underside). 194. *Eooxylides tharis distanti* Riley, ♀ (underside). 195. *Hypolycaena erylus teatus* Fruhstorfer, ♀ (underside). 196. *Marmessus ravindra moorei* (Distant), ♂. 197. *M. theda thesmia* (Hewitson), ♀ (underside). 198. *Zeltus amasa maximinianus* Fruhstorfer, ♀ (underside). 199. *Horaga syrinx maenala* (Hewitson), ♀. 200. *Sithon nedymond nedymond* (Cramer), ♂ (underside). 201. *S. nedymond nedymond* (Cramer), ♀ (underside). 202. *Remelana jangala travana* (Hewitson), ♂ (underside). 203. *Deudorix epijarbas cinnabarus* Fruhstorfer, ♂. 204. *D. epijarbas cinnabarus* Fruhstorfer, ♀ (underside). 205. *Rapala iarbus iarbus* (Fabricius), ♂. 206. *R. iarbus iarbus* (Fabricius), ♀ (underside). 207. *Halpe zema ormenes* (Plötz), ♂ (South Burma). 208. *H. zema ormenes* (Plötz), ♂ (underside). (Java).

All figures slightly reduced.

CHAPTER II

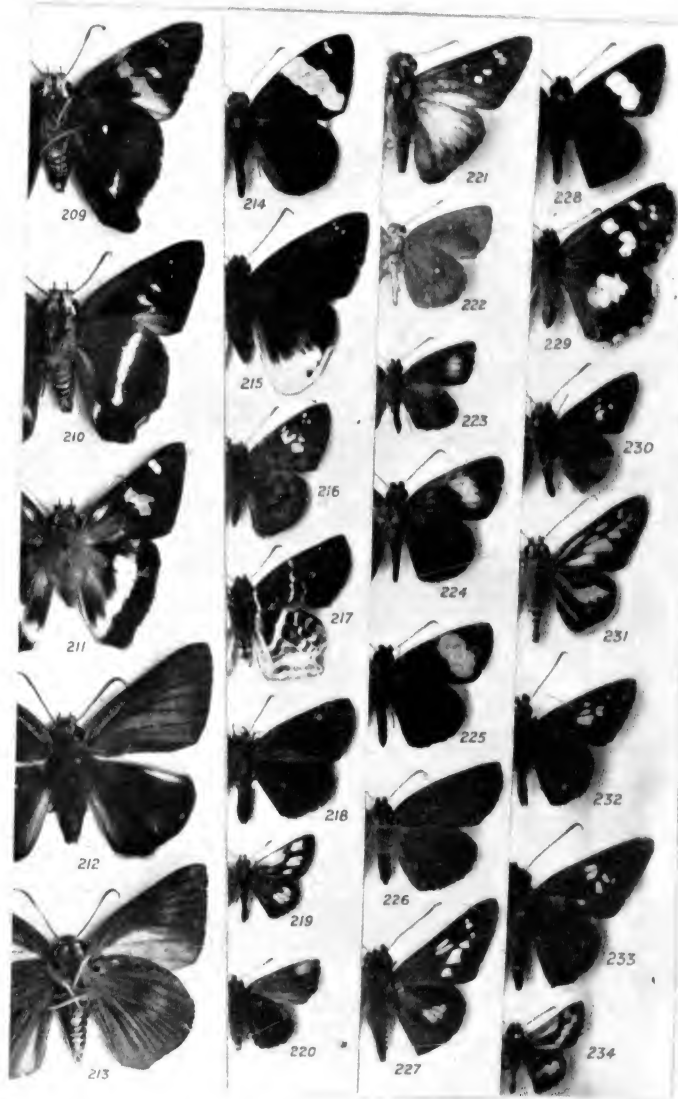
THE LIFE HISTORY OF BUTTERFLIES

BUTTERFLIES are included in that division of insects (the Holometabola) in which the metamorphosis is said to be complete. In other words, during their lives they pass through four distinct phases : the egg or *ovum*, the caterpillar or *larva*, the chrysalis or *pupa*, and the adult or *imago* (plural *imagines*).

(1) **THE OVUM.** Usually in butterflies the eggs are laid singly, but, in a few species, they are laid in masses. They are attached to the leaves of the food plant by means of a gummy secretion. They may be spherical, cylindrical or flask-shaped, and the outer shell (or *chorion*) is often sculptured. The *micropyle*, which comprises the one or more minute openings through which the male sperm reaches the interior, is situated at the top, away from the point of attachment. The eggs are almost always white, pale yellowish or greenish when laid, but they gradually darken as the larva inside develops. The structure of the egg is characteristic of the family. In the Papilionidae the eggs are spherical to dome-shaped, and without prominent sculpturing ; in the Pieridae they are flask-shaped, being about twice as tall as wide, and with longitudinal ribs ; eggs of the Nymphalid group of families are more or less melon-shaped, usually flattened at one or both ends, and prominently ribbed. Disc-shaped eggs, rounded at the edges, and with patterns formed by minute depressions are the order in Lycaenidae. The eggs are variable in Hesperidae, and may be disc- or dome-shaped or more or less spherical.

(2) **THE LARVA.** The young larva usually consumes the empty egg shell as its first meal, possibly owing to the fact that an empty, pellucid, white speck makes a rather conspicuous object which might attract the attention of enemies, but more probably because the ingredients of the shell are necessary to its growth. Then it eats the leaves of the food plant, and grows very rapidly during the process. The outer skin of a caterpillar does not stretch in proportion to the growth of its owner and, when it becomes too tight, it is cast or moulted and a fresh skin disclosed. The usual number of moults during the larval life is from four to five (sometimes as many as nine), and the period between moults is termed an *instar*.

Caterpillars of butterflies are variable in form, but, for the most part, they are roughly cylindrical in shape, and are often furnished with hairs, spines, tubercles or even filamentous appendages. Each hair or *seta* is surrounded at its base by a small cuticular ring, and the



209. *Hasora badra badra* (Moore), ♀ (underside). 210. *H. vitta vitta* (Butler), ♀ (underside). 211. *H. schoenherr chuzi* (Hewitson), ♂. 212. *Bibasis harisa consobrina* (Plötz), ♂. 213. *B. harisa consobrina* (Plötz), ♂ (underside). 214. *Celaenorrhinus aurivittata cameroni* (Distant), ♂. 215. *Tagiades gana gana* (Moore), ♂. 216. *Coladema dan dhyana* Fruhstorfer, ♂. 217. *Odon-toptilum pygela pygela* (Hewitson), ♂. 218. *Astictopterus jama jama* (C. and R. Felder), ♀. 219. *Ampittia dioscorides camerles* (Hewitson), ♂ (underside). 220. *Arnetta verones* (Hewitson), ♂ (underside). 221. *Pithauria stramineipennis stramineipennis* Wood-Mason and Nicéville, ♂. 222. *Iambrix salsala salsala* (Moore), ♂ (underside). 223. *I. obliquans obliquans* (Mabille), ♂. 224. *Koruthaialos rubecula rubecula* (Plötz), ♂. 225. *K. sindu sindu* (C. and R. Felder), ♂. 226. *Sancus fuligo fuligo* (Mabille), ♀. *Isma guttulifera* (Elwes and Edwards), ♂-f. *damocles* (Evans). 228. *Notocrypta paralyssos varians* (Plötz), ♂. 229. *Udaspes folus* (Cramer), ♀. 230. *Isma protoleia lapis* (Nicéville), ♂. 231. *Plastingia latoia latoia* (Hewitson), ♂. 232. *P. pugnans* (Nicéville), ♂. 233. *Lonchus calathus calathus* (Hewitson), ♂. 234. *Potanthus omaha omaha* (W. H. Edwards), ♂.

All figures slightly reduced.

study of the arrangement of the more important setae, known as *chaetotaxy*, is becoming increasingly important as regards the classification and determination of lepidopterous larvae. The thorny spinose processes found in certain of the Nymphalid larvae are termed *scoli* (sing. *scolus*).

In addition to the well-developed head, the larva has three thoracic and ten abdominal segments. The head is furnished with a pair of strong jaws and mouth parts of the typical herbivorous type, as well as a small spinneret from which silk is produced, a pair of very short antennae, and, normally, a set of six simple eyes or *ocelli* on each side.

The first three segments behind the head are known as the *prothorax*, *mesothorax* and *metathorax* respectively, and each bears a pair of short, jointed legs, which have their counterpart in the three pairs of legs in the adult. These thoracic segments may be referred to by the Roman numerals I, II and III. On the fourth to seventh abdominal segments and on the terminal (or tenth abdominal) segment are pairs of "sucker-feet" or *prolegs*, which are furnished on the inner margin with short hooks (*crochets*) for gripping the surface of leaves or the stem of the food plant. The terminal prolegs are somewhat different from the others and are often termed *claspers*. All these prolegs are lost when the caterpillar becomes a chrysalis. The abdominal segments may be signified by the Arabic numerals 1 to 10. On each side of segment I and of the segments 1 to 8 there is a *spiracle*, or breathing aperture.



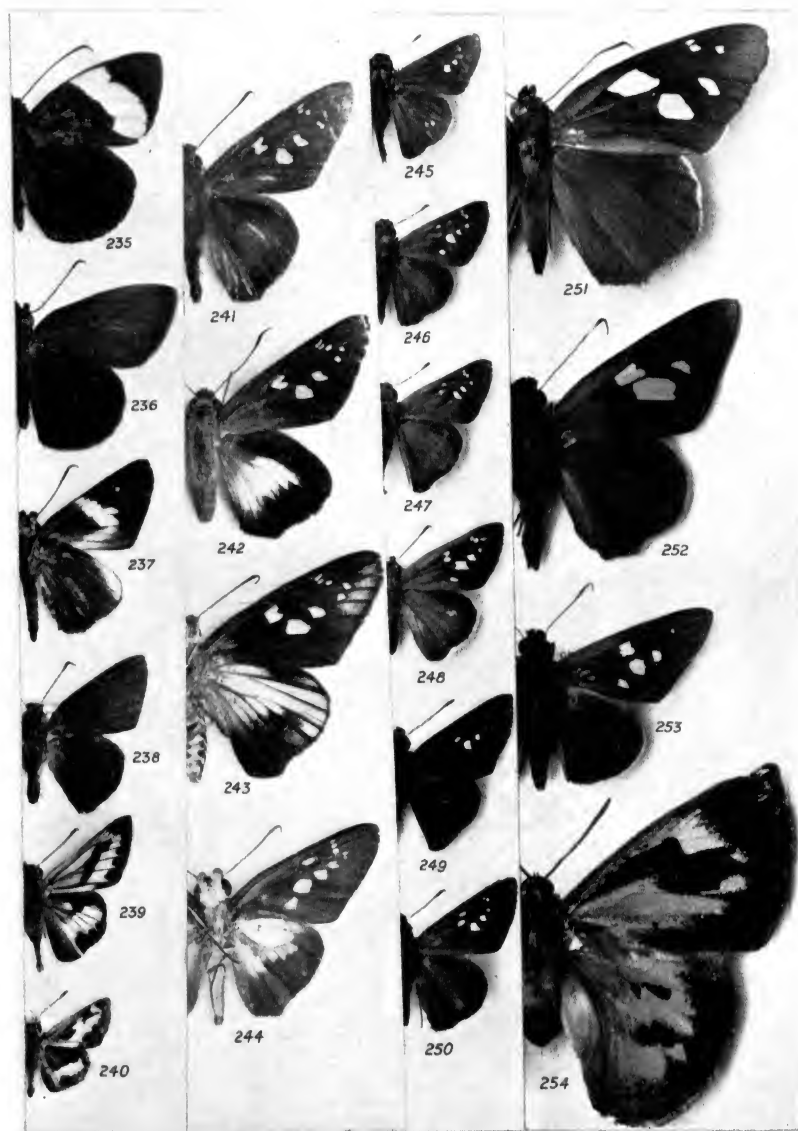
Fig. 5. *Papilio memnon*. Larva.

Although the larvae of almost all butterflies are plant feeders, at least one species of the Lycaenid subfamily Miletinae feeds on aphids, and some species of the same family spend a part of their lives in ants' nests.

When a larva is fully grown, it ceases feeding and finds some secluded spot on or near the food plant where its skin is cast for the last time and the pupa is disclosed.

While the Rhopalocerous larvae show considerable diversity in form, each family exhibits characteristic features, and rarely is there any difficulty in deciding to which family an individual larva belongs.

In the Papilionidae, the larvae are spindle-shaped with fleshy or spiny tubercles (*Troides* and *Atrophaneura*), or smooth, or almost so, with a conspicuous "saddle" or hump on the 1st and 2nd abdominal segments. In most species of this family the larva has an extrusible, fleshy, forked process (*osmeterium*), which is situated behind the head on the prothorax, and emits a faint and rather nauseous odour when the animal is alarmed.



235. *Anicistroides armatus armatus* (H. Druce), ♂. 236. *A. nigrita maura* (Snellen), ♂.
 237. *Lotongus calathus calathus* (Hewitson), ♀ (underside). 238. *Matapa aria* (Moore), ♂.
 (Sumatra). 239. *Telicota augias augias* (L.), ♂. 240. *Oriens gola pseudolus* (Mabille), ♂.
 241. *Unkana ambasa batara* (Distant), ♂. 242. *U. ambasa batara* (Distant), ♀. 243.
U. ambasa batara Distant, ♀ (underside). (South Burma). 244. *Ection elia* (Hewitson),
 ♀ (underside). 245. *Parnara naso bada* (Moore), ♂. 246. *Borbo cinnara* (Wallace), ♂.
 247. *Pelopidas mathias mathias* (Fabricius), ♂. 248. *Polytremis lubricans lubricans*
 (Herrich-Schäffer), ♀. 249. *Baoris oceia* (Hewitson), ♂. 250. *Calloris cahira austeni*
 (Moore), ♂. 251. *Gangara thyrsis thyrsis* (Fabricius), ♀ (Sumatra). 252. *Erionota thrax*
thrax (L.), ♂. 253. *Hidari irava* (Moore), ♂. 254. *Liphyra brassolis abbreviata* Strand, ♀.

All figures slightly reduced.

The Pierid larvae are rather long, cylindrical, smooth or slightly hairy and without processes. The smooth Danaid larvae are furnished with from two to four pairs of long, fleshy tentacles. In Satyridae the head is bifid and the anal segment ends in a pair of horns. The Amathusiid larvae are rather similar, but are thinly clothed with hairs. Usually, in the Nymphalidae, the larvae are furnished with branched spines, but, in the *Charaxes* and *Apatura* groups of genera, the larvae are smooth with horns on the head and anal segment. In the Lycaenidae and, usually, in the Riodinidae, the larvae are louse-shaped (*onisciform*), and with a small head which, in the former family, can be retracted into the prothorax. In most species of Lycaenidae there are glands on the 7th and 8th abdominal segments, which secrete a sweet liquid attractive to the ants with which the larva may be associated. In the Hesperidae, the larvae are long and cylindrical and characterised by the large head and constricted neck.

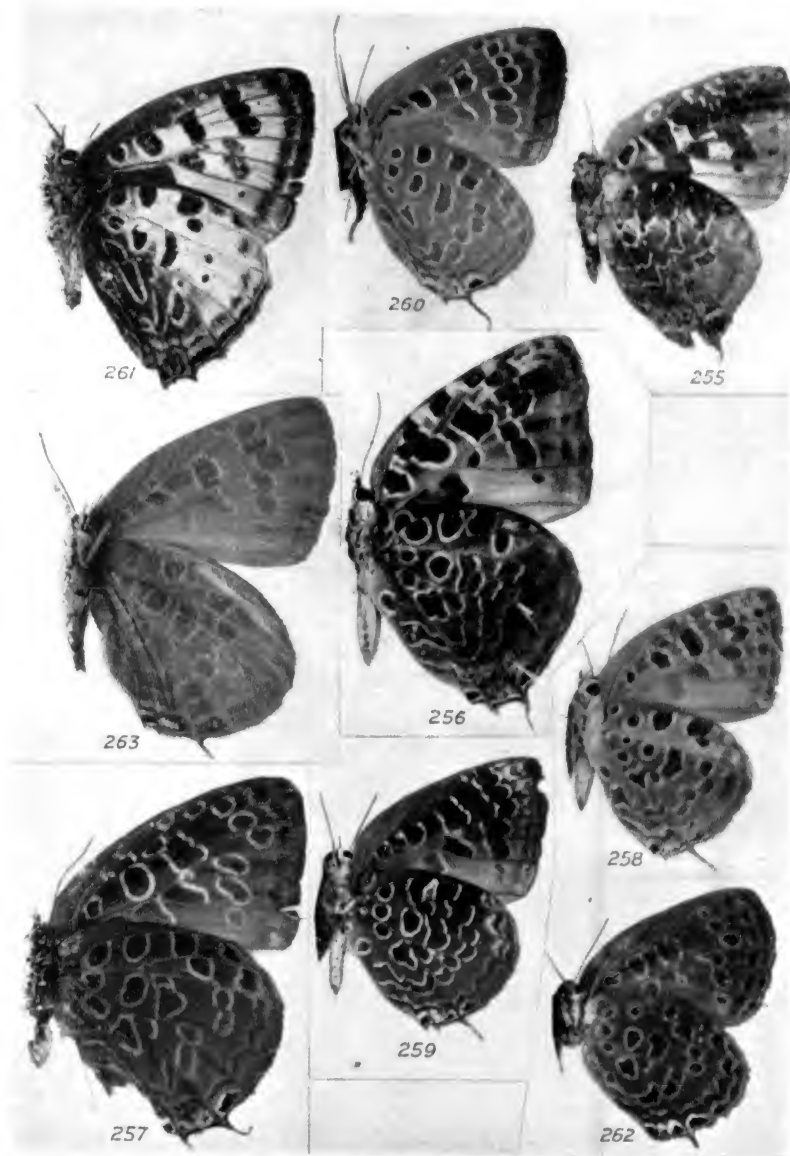
It is believed that the larvae of the Aristolochia-feeding species of Papilionidae (genera *Troides* and *Atrophaneura*), the Danaidae and certain genera of Nymphalidae, are distasteful to predatory animals, and this, according to widely accepted theory, would account for their conspicuous coloration and gregarious behaviour, at least during the earlier instars. Usually, larvae are coloured an inconspicuous shade of green, buff or brown, and often have markings which cause them to melt into their surroundings, and so escape the sharp eyes of their enemies. In some families, especially the Satyridae and Hesperidae, the larvae live concealed, and, probably in the majority of these species, feeding is restricted to the hours of darkness.

Food Plants. It would appear that the larvae of the Malayan species of butterflies feed on comparatively few species of plants, and that these, again, are mostly restricted to a few families. It will be to the advantage of the serious collector to become acquainted with some of the more important of these plants, and even to cultivate them in the garden. Unfortunately, there is no popular or semi-popular book on Malayan plants, but *The Kandy Flora* by A. H. G. Alston (1938) deals with most of the plants which serve as food plants to our local butterflies, and, as this book contains many excellent line drawings, it is a useful guide to plants for the entomologist.*

In our experience, one of the readiest means of getting to know Malayan plants is to ask a Malay friend to find them, giving him the vernacular names, most of which can be found in Watson (1928). The generic names of the food plants mentioned in the present book are arranged under the families of plants in the List on page 482.

Chaetotaxy. Very few Malayan species of butterflies have been bred from egg to adult, and our knowledge of the early stages is very imperfect. This is unfortunate, as the larvae are of considerable importance in classification; indeed, the most satisfactory scheme yet evolved for the

* See Appendix, p. 493.



255. *Arhopala ijauensis ijauensis* Bethune Baker, ♀ holotype (underside).
 256. *A. anthelus grahami* Corbet, ♂ holotype (underside).
 257. *A. anarte morphicolor* Corbet, ♂ holotype (underside).
 258. *A. achelous achelous* (Hewitson), ♀ (underside). (Borneo).
 259. *A. myrzala lammas* Corbet, ♂ holotype (underside).
 260. *A. azata* Nicéville, ♂ holotype (underside). (North-east Sumatra).
 261. *A. dispar pendleburyi* Corbet, ♀ holotype (underside).
 262. *A. johoreana* Corbet, ♀ holotype (underside).
 263. *A. hellada ozana* Fruhstorfer, ♀ (underside).

All figures $\times 1\frac{1}{2}$.

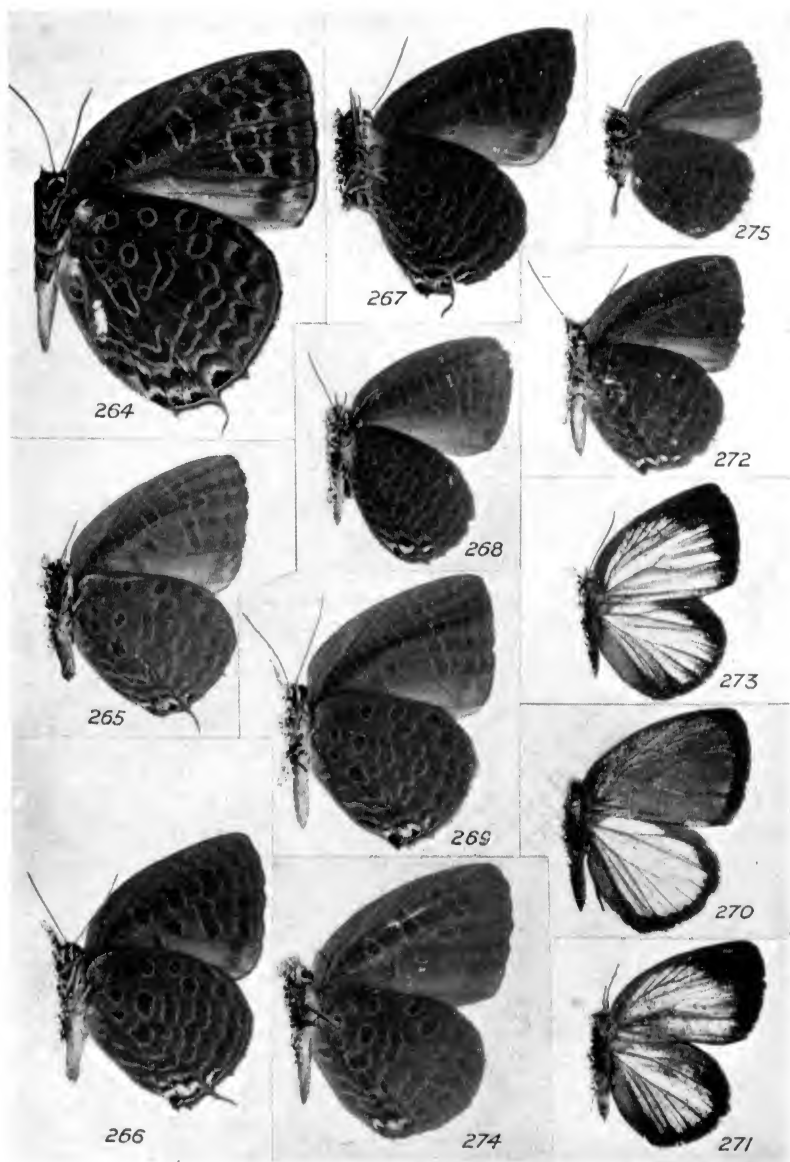
arrangement of the Nymphalidae is based on the structure of the larvae.

While it is important to note the general appearance and more obvious structural characters, the colour and pattern of larvae have not the prime significance attached to them by the older authors, and long and detailed descriptions of these features contribute relatively little to the basic knowledge of entomology. The classification of larvae depends on the arrangement of the primary setae and tubercles, which are present in the first instar of all lepidopterous larvae. But, unfortunately, in many families of butterflies, the position is complicated by the appearance of additional (secondary) setae and punctures in later instars, and, in some groups, these secondary structures are present even in the first instar.

Keys are in use for the separation of closely allied species of moths on the basis of the larval chaetotaxy, and it is important that the position should be investigated as far as the butterflies are concerned. To this end it is desirable that collections of the first and later instar larvae should be made. The larvae may be killed by immersion in boiling water for from one to one and a half minutes; they are then removed to 50 per cent. alcohol for half-an-hour and then placed in 80 per cent. alcohol. After a day or so the specimens are removed and stored permanently in 90 per cent. alcohol, preferably with a few drops of glycerine added, in a small tube or bottle, which must be tightly corked or stoppered. A label written in pencil should be placed in the fluid, and a second label stuck on the outside of the container. In order to obviate any mistakes in identification, a few adults, bred from this same batch of larvae, should be preserved in the same tube or bottle as the larval specimens. A representative collection of larvae of one or more families would be a most useful objective for a collector with the time and facilities for making it.

(Basic literature: Fracker, 1915, Hinton, 1946.)

(3) THE PUPA. The pupal stage is the resting period during which the larval characters are broken down and the perfect insect is built up within the chrysalis. The pupae are hard, usually smooth and rounded, and without appendages, and the shape and mode of pupation varies considerably in the different families. In the Papilionidae and Pieridae, the pupa is usually placed with the head uppermost, and attached to a stem or other support at its anal end and further supported by a silken girdle. In the Danaidae, Satyridae, Amathusiidae and Nymphalidae the pupa is anally attached and suspended head downwards. In the Hesperidae, the pupa is found resting between curled-up leaves drawn together by silken threads or enclosed in a cocoon, although, in some cases, it is attached to a support as in the Papilionidae. More diversity is shown in the Lycaenidae where the pupa may lie on the ground, be maintained in an upright position by a silken girdle, or be anally suspended. In pupae that are suspended, the anal attachment



264. *Arhopala aedias agnis* C. and R. Felder, ♀ (underside).
 265. *A. atosia malayana* Bethune Baker, ♂ (underside).
 266. *A. pseudomuta pseudomuta* (Staudinger), ♂ (underside).
 267. *A. allata pandora* Corbet, ♂ holotype (underside).
 268. *A. hypomuta hypomuta* (Hewitson), ♂ (underside).
 269. *Arhopala epimuta epiala* Corbet, ♂ holotype (underside).
 270. *A. metamula metamula* (Hewitson), ♀ (Sumatra).
 271. *A. muta maranda* Corbet, ♀ allotype.
 272. *A. moorei busa* Corbet, ♂ holotype (underside).
 273. *A. moorei busa* Corbet, ♀ allotype.
 274. *A. kurzi* (Distant), ♂ (underside).
 275. *A. avatha* Nicéville, ♂ (underside).

is effected by a series of hooks (collectively known as the *cremaster*), fixed to a silken pad spun by the larva on the surface from which it hangs.

In coloration many pupae are of a green or neutral tint which harmonises well with their surroundings. Others, especially among the Danaidae and Nymphalidae, may be ornamented with bright golden patches, and, in spite of this apparent advertisement, the general effect is often remarkable, giving, in the natural surroundings, the impression of an empty pupal case, or even of a dry and fretted leaf.

The building-up process within the pupa usually takes from a week to a fortnight in Malaya, and, when this is complete, the pupa splits along the dorsal surface and the adult gradually works its way out. When free of the empty pupal case, the butterfly crawls upwards so that the very small limp and crumpled wings can hang down and develop normally. As soon as they are fully expanded and sufficiently strong, the wings are opened and closed a few times before any attempt is made at flight. Emergence usually takes place in the early morning, and copulation frequently occurs before the wings are dry.

(4) THE IMAGO. After emergence and copulation, the sexes go their separate ways. The females busy themselves with oviposition, and thus are usually found singly in forest country where the food plant grows. Often, the males leave the cover of the forest and congregate along river banks, roads and in other open spaces. Sometimes the males move up or down the hills, and are found at different altitudes from the females.

The external anatomy of the adult butterfly has been discussed on page 4.

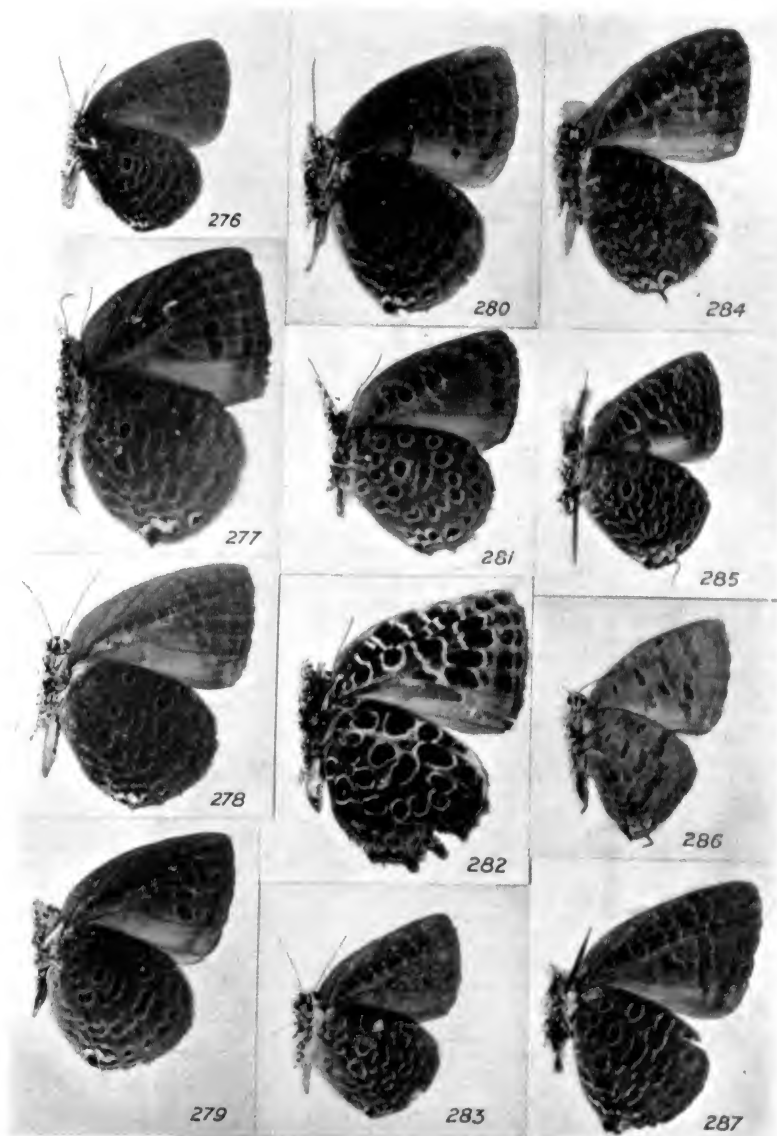
THE REARING OF BUTTERFLIES. Comparatively few species of butterflies have been bred in Malaya, and the details of the early stages are known mostly from observations made in other countries. T. R. Bell has published detailed accounts of the life histories of many species in a series of papers "The common butterflies of the plains of India" in the *Journal of the Bombay Natural History Society* (1909-1927), and, in more recent years, J. P. Rosier, and other Dutch workers, have described the early stages of a number of Javanese species in the volumes of the Netherlands Indies Entomological Society (*Entomologische Mededeelingen van Nederlandsch-Indië*).

Observations on the rearing of the early stages of butterflies may be recorded on the following lines. The eggs of butterflies are described by their shape, size, sculpture and colour, and notes should be made of any colour changes and of the time taken in hatching.

Caterpillars should be described in each instar separately as some species, especially in *Papilio*, alter in appearance at certain stages. A



Fig. 6. *Papilio memnon*. Pupa.



276. *Arhopala zyda elioti* Corbet, ♂ holotype (underside).
 277. *A. moolaviana yayuna* Corbet, ♂ (underside). (Sumatra).
 278. *A. agesilaus major* (Staudinger), ♂ (underside).
 279. *A. amphimuta amphimuta* C. and R. Felder, ♂ (underside).
 280. *A. asia* Nicéville, ♂ (underside). (Sumatra).
 281. *A. similis* H. H. Druce, ♂ (underside).
 282. *Arhopala agesias ovomaculata* (Hewitson), ♂ (underside). (Sumatra).
 283. *A. myrsalina* Corbet, ♂ (underside).
 284. *A. democritus lycanaria* C. and R. Felder, ♂ (underside).
 285. *A. alitacus parâenas* Corbet, ♂ holotype (underside).
 286. *A. atrax atrax* (Hewitson), ♂ holotype (underside).
 287. *A. havilandi arianaga* Corbet, ♂ holotype (underside).

All figures $\times 14$.

record should be kept of the dates when changes take place. Size, colour and any appendages or peculiarities should be noted, and the notes may be supplemented with a drawing or painting. When describing a caterpillar the following terms may be used : *dorsal*, the top surface of the body ; *subdorsal*, between the top surface and side ; *lateral*, the side of the body ; *sublateral*, lower than the lateral ; *ventral*, the under surface of the body. With these definitions, and the segment number (see page 14), the colour distribution and structures, particularly the exact position of strong hairs, warts etc., may be correctly denoted.

Caterpillars can be reared quite easily as long as a fresh supply of the food plant is maintained and they are kept free from excessive moisture and ants. Tins or boxes can be converted into suitable cages, if means are provided for keeping them clean, and they have adequate ventilation (viz. wire gauze or perforated zinc sides). The food plant can be kept fresh if the stem is put into a small bottle of water, and, if the mouth of the bottle is rather large, a plug of cotton wool will prevent the caterpillars from falling in the water. The bottle can be affixed to the bottom of a cage with the aid of Plasticine.

The form of the chrysalis should be described as far as possible ; the method of pupation, date of pupation, colour changes, date of emergence of the butterfly and the time, if observed, should be recorded.

The name of the food plant, even if only a generic or family determination, should be given whenever possible.

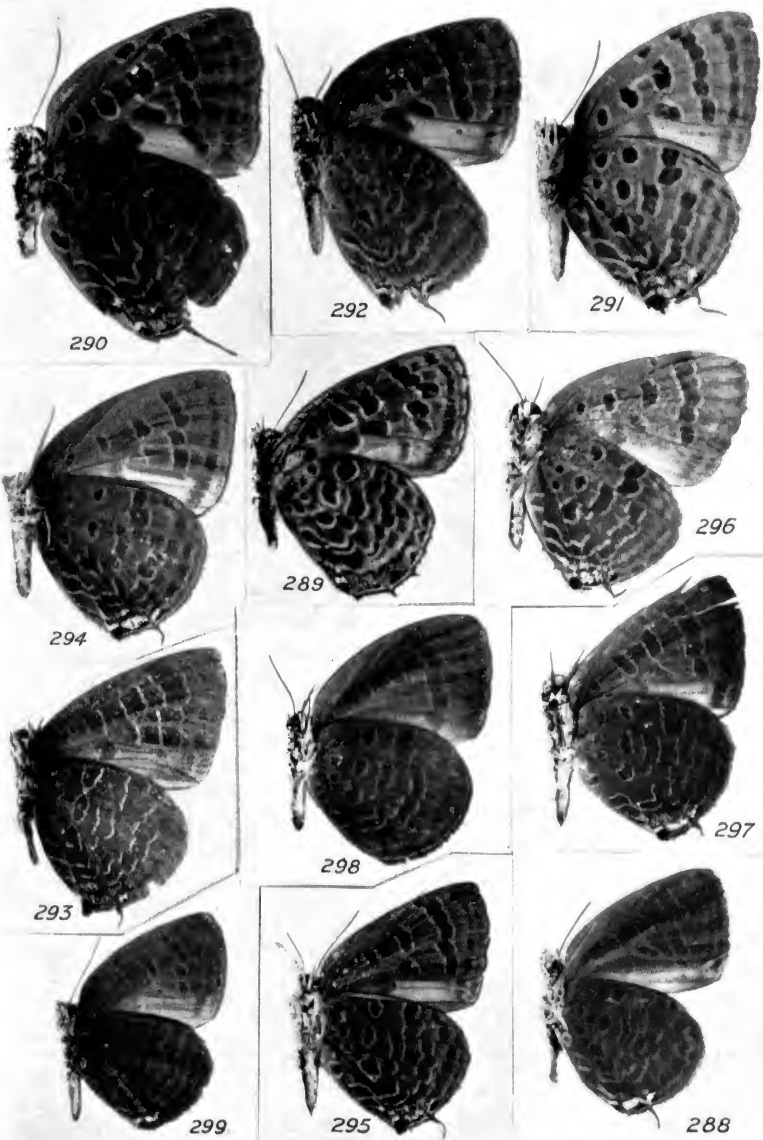
Natural Checks

Very little is known about the multitudinous forms of parasitic insects that act as a natural check on the early stage of butterflies and help to preserve an even balance in nature.

Eggs of butterflies are attacked by minute parasitic wasps belonging to the vast family Chalcididae (Hymenoptera).

Caterpillars are kept in check, not only by various parasitic wasps (Chalcididae, Ichneumonidae and Braconidae, in their widest sense), but also by flies (Diptera) of the families Tachinidae and Dexiidae. These flies somewhat resemble large house flies, but are distinctive in that their bodies are furnished with strong bristles, especially near the extremity ; furthermore, the bristle-like structure on the antennae (known as the *arista*) is naked and not ornamented with feathery hairs, as in house flies.

Parasites lay their eggs on or, more usually, inside the body of a caterpillar and the resulting wasp grubs or fly maggots hatch and feed on the internal organs of their host. They avoid the vital parts and appear not to cause undue inconvenience, as the caterpillar continues to feed and usually develops normally until it is full grown, by which time the parasites are ready to pupate. Often the caterpillar dies at this stage and the parasites emerge and form their own cocoons around or near the

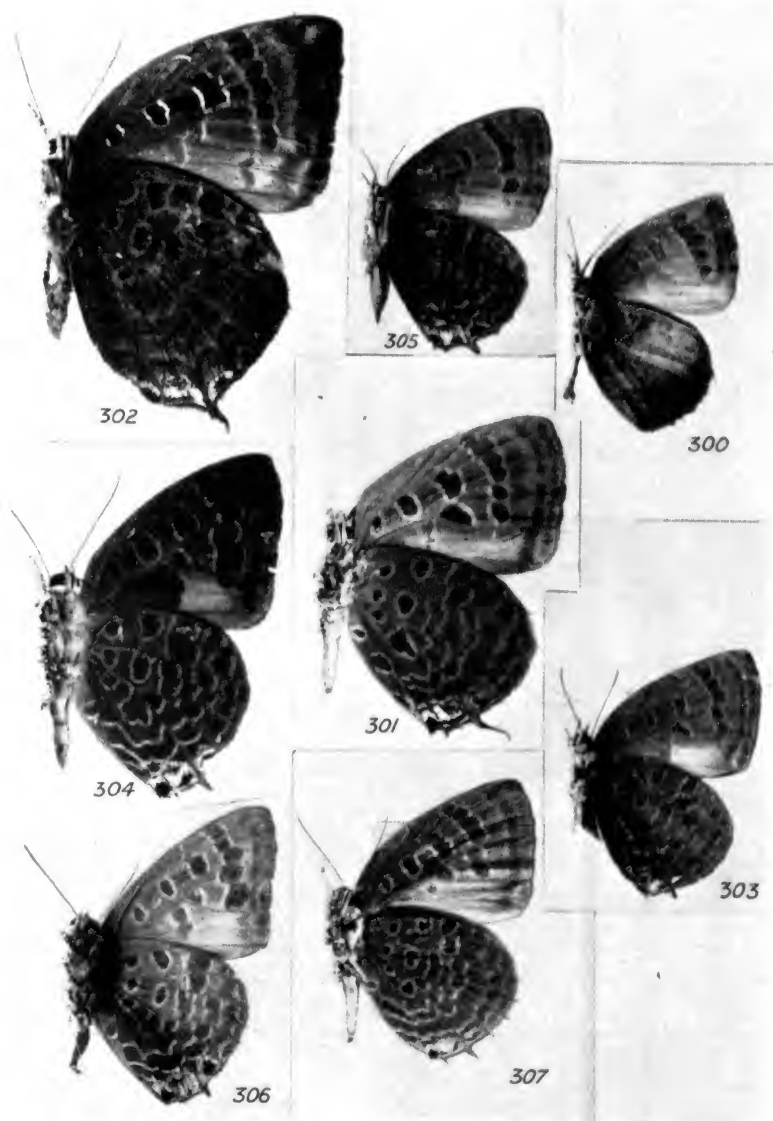


288. *Arhopala rafflesii rafflesii* Nicéville, ♂ (underside).
 289. *A. anella* Nicéville, ♀ (underside).
 290. *A. silhetensis adorea* Nicéville, ♂ holotype (underside).
 291. *A. zambra zambra* Swinhoe, ♂ holotype (underside). (South Burma).
 292. *A. apha aphadantas* Corbet ♂ (underside).
 293. *A. ace ace* Nicéville, ♂ (underside). (Sumatra).
 294. *Arhopala agrata agrata* Nicéville, ♂ (underside).
 295. *A. kouniga ridleyi* Corbet, ♂ holotype (underside).
 296. *A. aroa arops* Corbet, ♂ holotype. (Sumatra).
 297. *A. azinis* Nicéville, subsp., ♀. (North Borneo).
 298. *A. inornata inornata* (C. and R. Felder), ♀ holotype of *brahma* Bethune Baker (underside).
 299. *A. antimuta antimuta* C. and R. Felder, ♂ (underside).

shrivelled body of the larva, but sometimes the larva may pupate as usual and, in due course, there emerge from the pupa one or more parasitic wasps or flies instead of the expected butterfly.

Hyperparasitism is also known to take place, that is to say, the above-mentioned primary parasites may be themselves destroyed in a similar manner by others.

It would be of considerable interest and value to make a collection of lepidopterous parasites, provided that due attention is paid to the adequate labelling of specimens, particularly the name of the host. The small Hymenoptera can be preserved in tubes of 80 per cent. ethyl alcohol, with a label in each tube giving full data written in pencil or Indian ink. Large Hymenoptera and Diptera can be pinned through the thorax in the usual way and labelled : the wings need not be set.



300. *Arhopala perimuta regina* Corbet, ♂ (underside). (South Burma).
 301. *A. barami penanga* Corbet, ♂ holotype (underside).
 302. *A. centaurus nakula* (C. and R. Felder), ♂ (underside).
 303. *A. cooperi cooperi* Evans, ♂ holotype (underside). (South Burma).
 304. *A. corinda acesstes* Nicéville, ♂ (underside).
 305. *A. aurea* (Hewitson), ♀ (underside). (West Sumatra).
 306. *A. trogon* (Distant), ♂ (underside).
 307. *A. vihara vihara* (C. and R. Felder), ♂ (underside).

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CHAPTER III

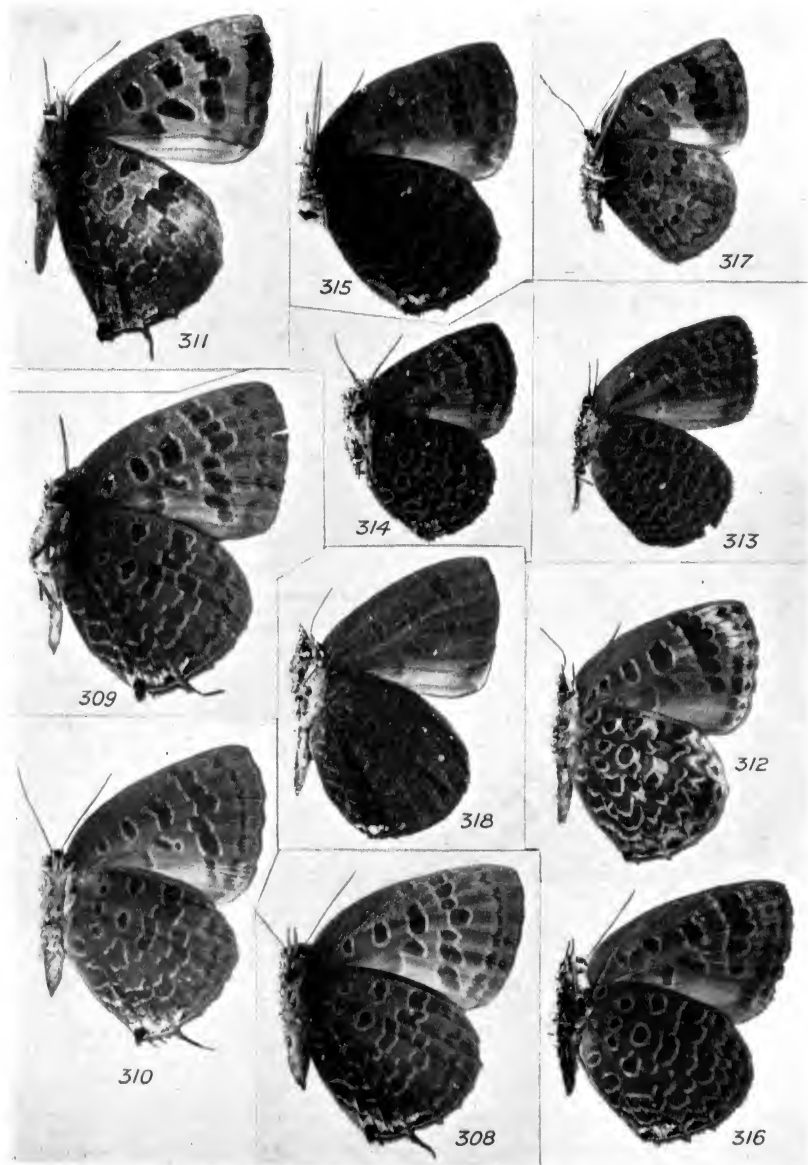
NOMENCLATURE AND CLASSIFICATION

THE fact that insects are usually referred to by their scientific names (e.g. *Hebomoia glaucippe*) rather than by popular names, such as "The Great Orange Tip," has done much to discourage interest in entomology among amateurs in the tropics. Nevertheless, scientific names are authoritative and are understood by biologists the world over, while popular names must inevitably be circumscribed in use.

The binominal system of nomenclature in use to-day was first proposed by the Swedish naturalist Carolus Linnaeus (Carl von Linné), who introduced it in the tenth edition of his *Systema Naturae* in 1758. According to the Linnaean scheme, all animals and plants are known by a combination of two names, the first indicating the *genus* and the second the *species*. It is not easy to define this latter term precisely, but, for the immediate purpose, a species may be regarded as an assemblage of individuals closely resembling one another and of common descent, sharing certain distinctive characters and having a common area of distribution, and potentially capable of interbreeding. A genus is a group of closely allied species. According to modern rulings, for zoological names to be valid they must be accompanied by a description when first published by the author. In the present system the name is the index to the literature.

As far as the Lepidoptera are concerned, however, the adoption of the Linnaean system has not proved an unqualified success, although it is difficult to suggest a more satisfactory alternative. For stability of nomenclature in a system in which the name of a species or lesser form is linked with its generic status, it is essential that there should be a large measure of unanimity of opinion regarding the generic concept. Actually, complete agreement does not exist among zoologists to-day with the result that species are transferred from one genus to another with bewildering frequency, and, often, on slender pretext. Already, as far as Lepidoptera are concerned, there are signs of a dual system of nomenclature coming into use, for many workers insist on forming genera solely on the basis of the male genitalia, and, when this is done, males can be classified only after dissection, and, often, females cannot be determined at all. Inevitably, therefore, the practical entomologist must use a system of classification in which the generic divisions are not as fine as those employed by the specialist.

Linnaeus' great work *Systema Naturae* ran through twelve editions, and the *tenth edition* which appeared in 1758 is now taken as the starting



308. *Arhopala eumolphus maxwelli* (Distant), ♀ (underside).
 309. *A. horsfieldi basiviridis* Nicéville, ♀ (underside). (Sumatra).
 310. *A. bella* Bethune Baker, ♀ (underside).
 311. *A. bazalus zalinda* Corbet, ♂ holotype (underside).
 312. *A. alaconia aloana* Corbet, ♂ holotype (underside). (South Burma).
 313. *A. cardoni* Corbet, ♂ holotype (underside).
 314. *Arhopala wildeyana wildeyana* Corbet, ♂ holotype (underside).
 315. *A. agelastus agelastus* (Hewitson), ♀ (underside).
 316. *A. labuana labuana* Bethune Baker, ♂ (underside). (Borneo).
 317. *A. epimete suedas* Corbet, ♂ holotype (underside).
 318. *A. arvina adalita* Corbet, ♂ holotype (underside).
 319. *A. ...*

All figures $\times 1\frac{1}{2}$.

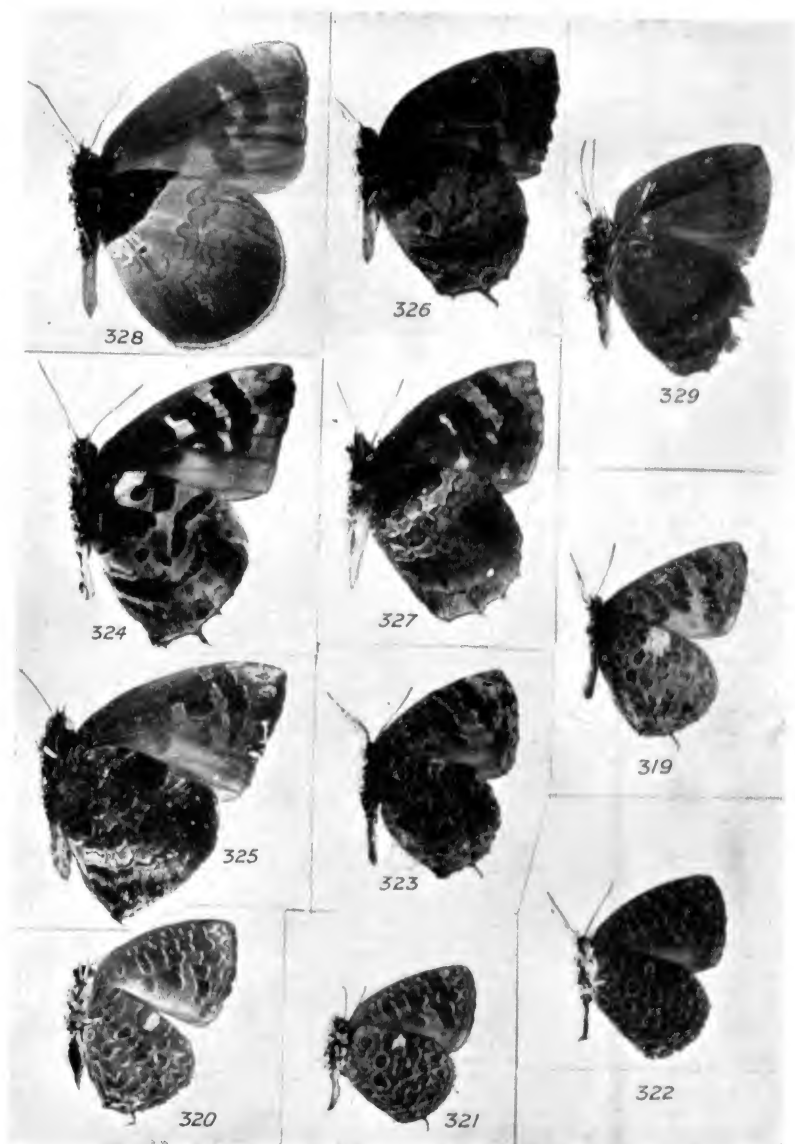
point of zoological nomenclature. When his works were in preparation, Linnaeus had comparatively few species of tropical insects for study, and, consequently, a laconic definition was sufficient to indicate each of them. Since Linnaeus' time immense numbers of animals have been discovered, and the need for more detailed and exact descriptions has become increasingly important.

When a new species (or form of lesser status) is described, the author selects a particular specimen from the series before him and designates and labels it as the *type* of the species described. Any doubts that may arise subsequently as the result of an inadequate description can be resolved by reference to the type specimen. For this reason a type specimen is endowed with a certain sanctity and should be preserved in a collection where it is readily available, for instance in a museum, and, as far as Malayan insects are concerned, preferably in the British Museum (Natural History), South Kensington, London, S.W.7, where a majority of the Malayan type specimens of Lepidoptera repose. The practice of retaining types in a private collection is to be deplored, unless the owner is a specialist on certain groups and it is understood that his collection eventually will become the property of a public or national museum.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE. To ensure uniformity in the treatment of scientific names of animals, the International Commission on Zoological Nomenclature was established in 1901, and this body has drawn up a set of rules for the guidance of authors and other zoologists. These rules were last published in *Procedure in Taxonomy* (Stanford University Press, 1948). From time to time the Commission meets and publishes *Opinions* on difficult or controversial points regarding the rules; and a journal, the *Bulletin of Zoological Nomenclature* is also published by the Commission.

In zoological nomenclature it is obligatory to employ a capital letter for the *generic* name whereas the second or *trivial* name, as it is properly called, is not capitalised. The combination of the generic and trivial names is termed the *specific name*. The only valid trivial name for an animal species is the one first published after 1st January, 1758, accompanied by an indication, definition or description. In cases in which the same species has been described under various names by different authors, the first valid name published is alone available, the others being regarded as synonyms and, for all practical purposes, ignored. Nevertheless, it is often important to know the synonyms of a species as it may have been referred to in the literature under a variety of names.

In serious work the specific name should be followed by the name of the author of the trivial name, and, in systematic work, the year of publication of the name is desirable. It will be noticed throughout the present book that, more often than not, the author's name (or a standard abbreviation of it) appears in brackets; this is to show that the species



319. *Arhopala paraganesa birmana* (Moore), ♂ underside). (South Burma).
 320. *A. ammon* (Hewitson), ♂ holotype (underside).
 321. *A. ammonides chunsu* Fruhstorfer, ♂ (underside).
 322. *A. ariel antis* Corbet, ♂ holotype (underside).
 323. *A. abseus abseus* (Hewitson), ♂ (underside).
 324. *A. diardi almansor* Fruhstorfer, ♂ (underside).
 325. *Arhopala anniella anniella* (Hewitson), ♂ holotype (underside).
 326. *A. apidanus kartaphilus* Fruhstorfer, ♂ (underside).
 327. *A. areste* (Hewitson), ♂ (underside). (Burma).
 328. *A. morphina morphina* (Distant), ♂ (underside). (Sumatra).
 329. *A. fulla intacta* Corbet, ♂ holotype (underside). (Borneo).

All figures $\times 1\frac{1}{2}$.

is now placed in a genus different from that used in the original description. For instance, the "Common Grass Yellow," *Eurema hecabe* (L.) was first described by Linnaeus in 1758, but he placed all the butterflies in a single comprehensive genus and the "Grass Yellow" was *Papilio hecabe*.

SUBSPECIES. There are a few widely distributed species of butterflies in which individuals from one part of the range are indistinguishable from those from any other part. For instance, in the cosmopolitan "Painted Lady" (*Vanessa cardui*), it is impossible to discover the place of origin of a particular specimen by a study of the wing pattern, and such is the position also with the "Peablu," *Lampides boeticus*, which occurs throughout the tropical and subtropical parts of the Old World.

These examples of uniformity in wing pattern over wide areas, however, are exceptional and are practically confined to migratory species. In general, the representatives of widely distributed species show differences in wing pattern from one part of the range to another, and this is especially the case with land areas isolated by natural barriers, such as the sea, high mountain ranges or deserts. These geographical differences are due, undoubtedly, to prolonged isolation during which local environmental differences have probably played a large part. Some species are evidently more susceptible to such influences than others.

Thus, it may come about that the Malayan representative of a species may be differentiated in certain respects from the local form of the same species in Siam or in Sumatra, Borneo or Java, and, in order to distinguish between these geographical races, or *subspecies*, as they are more frequently called, a subspecific name is added to the specific name. For example :

Papilio nephelus Boisduval, was described from Java. Java is therefore the "type locality" of the species and the home of the nominotypical subspecies, which should be designated :

Papilio nephelus nephelus Boisduval.

But the species also occurs in other areas and other subspecies, for example :

Papilio nephelus chaon Westwood, North-east India to North Burma.

Papilio nephelus ducenarius Fruhstorfer, South Burma.

Papilio nephelus raya Corbet, Peninsular Siam to the Langkawi Islands.

Papilio nephelus sunatus Corbet, Malaya.

Papilio nephelus albolineatus Forbes, Sumatra and Borneo.

In the islands off the west coast of Sumatra yet further distinct subspecies are found, e.g. :

Papilio nephelus uranus Weymer, Nias.

Papilio nephelus tellonus Fruhstorfer, Batu Islands.

Papilio nephelus siporanus Hagen, Mentawi Islands.

And so on. This method of indicating the subspecies is known as the trinominal system, and is now in general use in Lepidoptera. No hard and fast rules can be laid down regarding subspecific values as the distribution of a species may be irregular. Sometimes Malayan and Sumatran, or Malayan and Bornean subspecies are inseparable, and in other cases distinct subspecies may occur in each faunal area.

SEASONAL FORMS. In the temperate regions many butterflies are double- or even triple-brooded, and individuals from the respective broods are usually distinguished by the wing markings. In the monsoon areas in the tropics, there are seasonal differences in rainfall rather than in temperature, and, in certain species of butterflies, more or less sharply differentiated seasonal forms are found in such localities. In some countries, but not in Malaya, these seasonal forms have received names.

DIMORPHISM AND POLYMORPHISM. In some species of butterflies one or both sexes occur in more than a single form, and it is usual for the different forms to receive distinctive names. Usually, only the female sex is *dimorphic* or *polymorphic*, although both sexes are dimorphic in *Chlusa clytia* and *C. paradoxa*, and the male alone is polymorphic in *Euthalia monina*. The classic case is that of *Papilio polytes*, in which the female occurs in two forms, the first resembling the male and the second bearing a general resemblance to *Atrophaneura aristolochiae*. The case of *Papilio polytes* is further discussed on page 41.

ABERRATIONS. Most species will from time to time throw up individual specimens which differ to a marked degree from normal specimens. These rare varieties often follow set patterns in different genera and recur often enough to require names. These names of aberrations, as they are generally called, are now treated as being in a different category nomenclatorially from the names of species and subspecies, so that the latter always have precedence, the name of an aberration cannot supplant a specific name, even if it is of earlier date and both apply to the same species.

CHAPTER IV

GEOGRAPHICAL DISTRIBUTION

FOR the purpose of studying the distribution of animals, zoologists divide the world into five fairly well defined faunistic regions. With the exception of a few cosmopolitan species, which have been distributed mainly through human agency, the fauna of each region is characteristic and distinct. These regions are as follows :

The Palaearctic Region (Temperate Old World) comprises the whole of Europe, southwards to Africa north of the Sahara Desert, and eastwards to that portion of Asia which lies to the north of a line running along the Himalayas, through central China to Nanking and Hangchow Bay and between Japan and the Ryukyu Islands.

The Ethiopian Region includes Africa and the neighbouring islands with the exception of that part of the continent north of the Sahara Desert.

The American Region includes the whole of North and South America, but, as would be expected, the fauna of tropical Central and South America (Neotropical Subregion) exhibits considerable differences from that of temperate North America (Nearctic Subregion). A gradual transition in the fauna is observed in passing southwards from Canada, across the United States and Central America, into Brazil.

The Australian Region is divided into three main subregions : the Polynesian, the Papuan (which includes the Moluccas, Key and Aru Islands, Timor Laut and New Guinea) and the Australian.

The Oriental Region comprises Asia south of the Palaearctic Region, the Large Sunda Islands (Sumatra, Borneo and Java), the Philippine Islands, Celebes and the Lesser Sunda Islands as far east as Timor.

The Oriental and Australian Regions are separated by *Weber's Line*, which marks the western boundary of the Sahul Shelf. It is often convenient to group together these two regions as the *Indo-Australian Region*, as quite a proportion of the animal species are found on both sides of the Weber Line.

The Malaysian Subregion, or Malaysia

It has been established that, as late as the Pleistocene Age, the present Malay Peninsula, the Large Sunda Islands (Sumatra, Borneo and Java) and their satellite islands, and almost certainly Palawan and Balabac also (which are now politically part of the Philippines group), were

united to form a large continent which has been termed *Sundaland*. Most of this ancient land now lies beneath the sea and constitutes the Sunda Shelf, the depth of which nowhere exceeds 100 fathoms and is usually less than 30 fathoms. The two outstanding features of the Sunda Shelf are its shallowness and the remarkably uniform surface.

During the glaciations in the temperate parts of the world, and the consequent fall in sea-level, much or all of the Sunda Shelf was exposed, and there was an uninterrupted land passage between the neighbouring islands and the present Malay Peninsula. With the melting of the ice-sheets in the colder regions, however, the sea-level rose around Sundaland which again disintegrated into islands. There is evidence indicating that, at times, the sea-level was raised at least 50 feet, and possibly even 200 to 300 feet, above the present level. This alternation of submergence and emergence must have been repeated several times. It is generally conceded that prolonged isolation is one of the most potent causes of species-formation so that, during the interglacial periods, when the insular representatives of the more widely distributed species remained isolated, conditions were favourable for the development of distinct geographical races, or subspecies, and then, when the isolation was sufficiently prolonged, for their further development into species. The remarkable multiplicity of closely allied species such as occurs to-day in such Malaysian genera as *Allotinus*, *Arhopala*, *Poritia* and *Simiskina* is to be attributed to the repeated union and separation of the Large Sunda Islands and Malaya during the Pleistocene.

The position regarding the land connection between Sundaland and the mainland of Asia is more obscure. It seems certain that Malaya was formerly separated from the mainland by an arm of the sea, and the presence of a strong Burmese element among the Malayan butterflies, which is absent from the Sumatran fauna, indicates that the final union between Malaya and continental Asia took place after the final separation of Malaya and Sumatra. The biological evidence suggests that the old sea channel was somewhere in the neighbourhood of the present course of the Sungei Kedah, but, from the geological data, it appears that the sea channels were situated farther north, and the faunal barrier now existing in north Malaya is largely climatic. A comparison of the fauna and flora of Burma and Malaya suggests a longer separation than would be anticipated from purely geological evidence. (See Corbet, 1941a, Zeuner, 1941.)

In defining the Malaysian Subregion, we follow Boden Kloss (1929) and consider that Malaysia embraces the Malay Peninsula south of Latitude 10° N., together with all the islands standing on the Sunda Shelf, that is, Sumatra, Borneo, Java, Bali, Balabac, Palawan, the Calamianes and Cuyos Islands and the smaller intervening islands, the islands off the west coast of Sumatra, and also Christmas and Cocos-Keeling Islands. The eastern boundary of Malaysia is known as

Wallace's Line, and there has been considerable controversy as to its biological significance (Mayr, 1944).

We consider it more than doubtful if the Nicobar Islands pertain to the Malaysian Subregion.

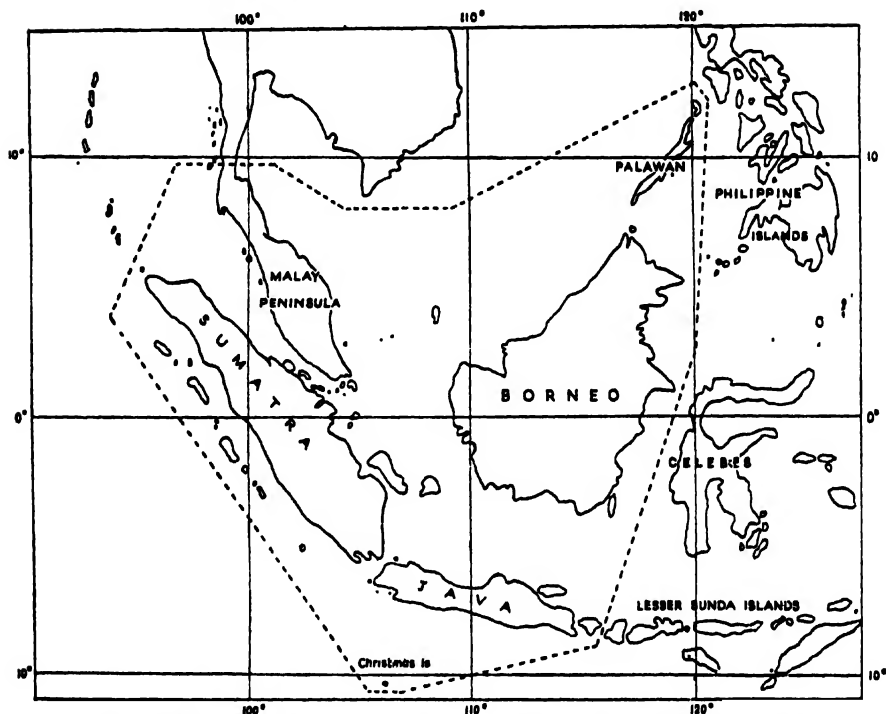


Fig. 7. Malaysia. The zoogeographical subregion of Malaysia, as defined by Kloos (1929), is the area enclosed within the dotted line. Neomalaya consists of the Malay Peninsula, Sumatra and Borneo, and the much less homogeneous division of Paramalaya comprises the chain of islands off the west coast of Sumatra. From north to south, these latter islands are Simalur, Nias, the Batu Islands, the Mentawi Islands and Engano.

While a glance at the map might suggest that the fauna of Malaya would show a closer affinity with that of Burma than with that of Sumatra, or even Borneo, this is not indeed the case for the reasons given in the preceding paragraphs. It is true that the Malayan fauna contains a number of Burmese elements which are absent from the rest of Malaysia, but these are undoubtedly recent arrivals, and, rather strangely, as far as the butterflies are concerned, they are largely confined to the mountains in Malaya although found on the plains in the north. It appears that there has been a greater tendency for a gradual infiltration of species from the south northwards than in the opposite direction. This matter is discussed further on page 30. From the faunistic standpoint,

it is important to recognise the Malay Peninsula as the north-western limit of the Malay Archipelago rather than the south-eastern extension of the Asiatic mainland. Apart from the barrier of the surrounding seas and the bottle-neck in the north-west, the remarkably uniform character of the Malaysian fauna has been preserved by the dry climatic belts in the north-west and south-east.

NEOMALAYA. Although the Malaysian Subregion constitutes a fairly homogeneous faunal area, it is clearly divisible into three further sections showing approximately equal degrees of specialisation. Of the islands off the west coast of Sumatra, Simalur, Nias and Engano are not on the Sunda Shelf, and the Batu and Mentawi Islands are separated from the Sumatran mainland by deep channels. In general, the fauna of these islands is well differentiated from the rest of Malaysia, and we follow Toxopeus (1926, *Tijdschr. Ent.*, 69: lxx) in referring to them as *Paramalaya*.

There is no doubt that Java was the first major island to be isolated from the rest of Sundaland after the Last Glaciation, and it is not surprising, therefore, that its fauna is less rich but more differentiated than that of Malaya, Sumatra or Borneo. *Java* constitutes a second faunistic division within Malaysia, while the remainder, which comprises the Malay Peninsula, Sumatra and Borneo and their satellite islands, forms a remarkably homogeneous faunistic unit termed *Neomalaya* by Moulton (1915, *Entomologist*, 48: 155).

To a very large extent, Malaya and the islands of Sumatra and Borneo possess the same species of animals and plants, but, on account of its land connection with the Asiatic mainland, the Peninsula has additional species which have not yet reached the Sunda Islands. As a rule, the Sumatran representatives are more nearly allied to the Malayan than are the Bornean, but this is by no means invariably the case and, in some species, the forms from Malaya, Sumatra and Borneo are indistinguishable.

The Malay Peninsula

The principal topographical feature of the Malay Peninsula is the central granitic mountain range which runs about two-thirds the length of the Peninsula and has an average height of between 3,000 and 4,000 feet, although rising to 7,000 feet in some places. Although granite is the most extensive geological formation in Malaya, there are also quartzite deposits and, especially on the north-west coast, a number of limestone bluffs. Of the few smaller and lower ranges running parallel to the main range, the chain of Larut Hills, in Perak, is best known.

The rivers mostly flow west and east, with the source in the main range. They start as swift, mountain torrents, with many rapids and cascades, but the lower reaches are shallow. Some of the rivers are of considerable length, the longest being the Sungei Pahang (about 200 miles), which flows into the China Sea.

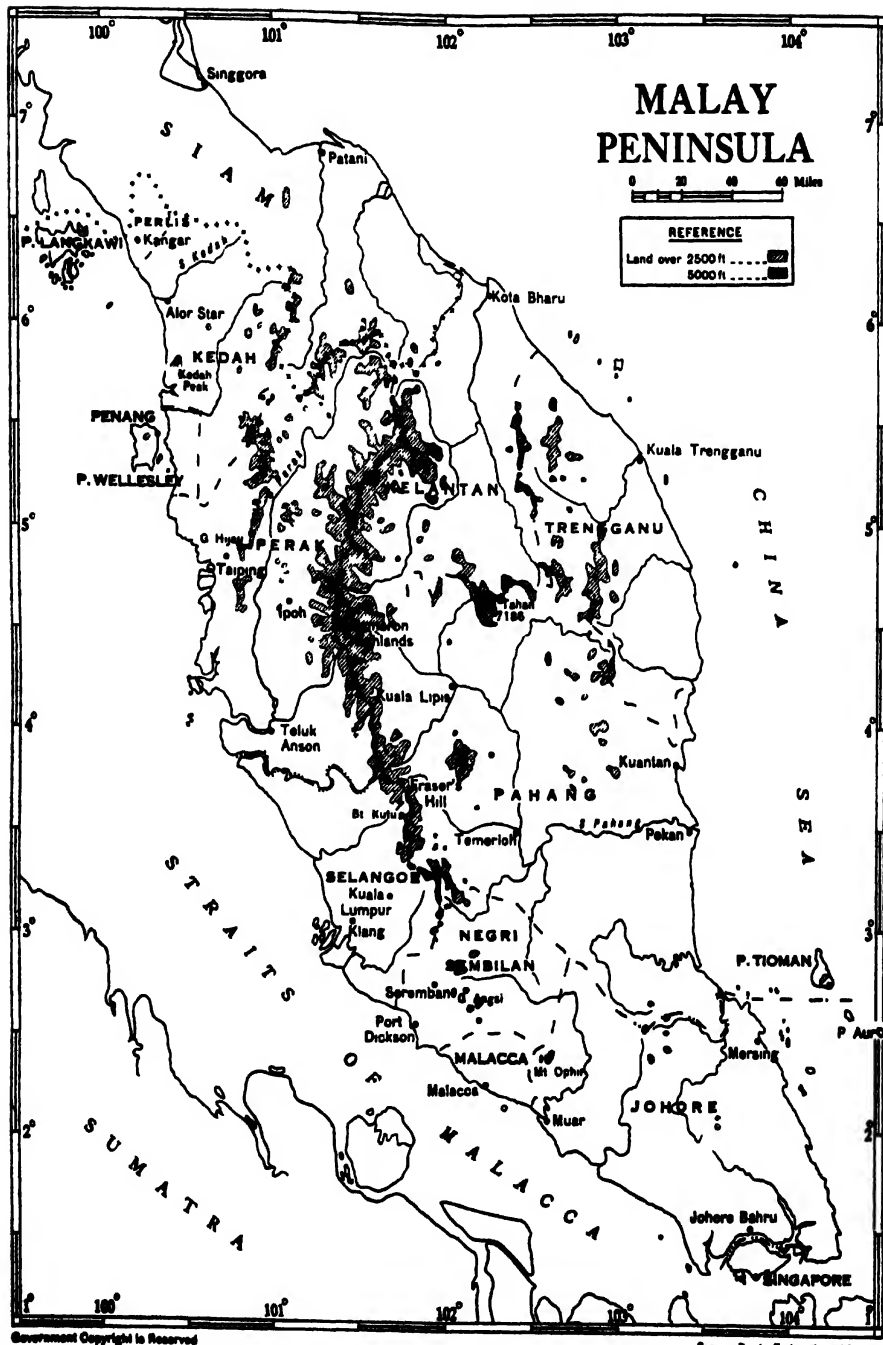


Fig. 8. Map of the Malay Peninsula to illustrate principal collecting localities and hills.

Apart from Singapore and Penang, the largest islands off the coasts of Malaya are those of the Langkawi group, some 60 miles from Kedah, Pangkor, off Perak, and the islands of the Tioman and Aor group, off the coasts of Pahang and Johore. In the days of sailing ships, these last two islands were well known landmarks, but they appear to have been but little visited since.

On the plains of Malaya, the mean annual shade temperature is about 80° F. (about 27° C.); usually, the temperature rises to over 90° in the afternoon and falls at night. The mean shade temperature varies only a degree or two from one month to another. The south-west monsoon, which blows in the Indian Ocean from June to September, affects only the extreme north-west of the Peninsula. Except during the hottest part of the day the atmosphere is about 85 per cent. saturated with water vapour, or more, and it is this combination of high temperature and high humidity that makes the climate so enervating.

The rainfall of Malaya is about 90 inches per annum on the plains, with slight but definite local and seasonal fluctuations. Usually the rainfall increases as the hills are ascended, and "The Cottage," in the Larut Hills, at 4,558 feet, has an annual rainfall of nearly 250 inches. In north-west Malaya, there is a dry period from December to February,

THE RAINFALL IN MALAYA IN INCHES

	Pulau Langkawi	Alor Star, north Kedah	"The Cottage," (4,558 ft.), Larut Hills, Perak	Cameron Highlands, (4,750 ft.), Pahang	Fraser's Hill (4,286 ft.), Pahang	Kuantan, east Pahang	Kuala Lumpur, Selangor	Singapore
January ..	1.39	2.47	14.15	7.86	13.91	15.22	6.64	9.88
February ..	1.72	2.08	10.15	5.34	6.78	9.05	6.04	6.62
March ..	5.31	5.93	17.35	8.50	11.09	8.35	8.79	7.40
April ..	7.32	8.73	22.00	13.82	11.78	6.28	10.67	7.64
May ..	10.24	11.09	23.06	9.46	6.94	6.62	8.98	6.65
June ..	7.93	7.83	16.69	5.93	4.77	5.61	4.87	6.85
July ..	8.55	7.88	11.89	4.18	3.57	5.64	4.18	6.77
August ..	11.19	10.81	17.60	5.57	3.28	6.22	6.22	7.95
September ..	12.19	13.45	23.79	12.72	8.03	7.78	7.27	6.77
October ..	13.65	11.70	33.90	11.93	11.04	10.83	11.13	8.07
November ..	7.48	7.98	31.60	14.57	15.39	13.46	10.04	9.92
December ..	3.71	5.79	21.43	11.08	13.99	23.41	9.57	10.55
Total for the year ..	90.68	95.74	244.51	110.96	110.57	118.47	93.80	95.07
Number of years of observa- tions ..	13	23	26	6	8	33	51	52

when the total rainfall for these months is about one-eighth to one-tenth of the total for the year. The mornings are normally bright and clear, especially in the lowlands, and rain storms are most frequent in the later afternoon.

As the matter is of importance to butterfly collectors, a summary of the rainfall figures published by Stewart (1930) for certain localities is given in the appended Table (p. 29).

The Distribution of Butterflies in Malaya

In the Malay Peninsula, the butterfly species are more or less evenly distributed, subject to certain restrictions of altitude and plant association. Rather more than half of the total species are confined to the plains, one-seventh are found only on the hills above 2,500 feet, and between a quarter and one-fifth occur on both sides of the 2,500-foot line.

In the conditions of high temperature and humidity and heavy rainfall characteristic of the equatorial belt, one brood of butterflies rapidly succeeds another throughout the year, and the species are continuously on the wing. Records of collecting by Corbet from 1927 to 1932 show that butterflies generally are more abundant in Malaya proper from April to September than during the rest of the year, although certain species favour the period from December to May.

The species are not equally abundant. The majority are confined

DISTRIBUTION OF THE MALAYAN SPECIES OF BUTTERFLIES OUTSIDE THE MALAY PENINSULA

Family	Total Species in Family	Species found also in				
		Ceylon	Burma, north of Tavoy	Sumatra	Borneo	Java
Papilionidae	44	10	32	38	34	28
Pieridae	44	16	34	38	32	29
Danaidae	34	10	23	29	26	27
Satyridae	53	5	35	39	32	25
Amathusiidae	25	—	10	21	20	9
Nymphalidae	140	27	97	123	118	95
Libytheidae	1	1	1	1	1	1
Riodinidae	16	—	9	13	11	8
Lycenidae	332	47	196	248	248	169
Hesperiidae	209	33	150	152	149	106
Total	898	149	587	702	671	497
In percentages	..	16.6	65.4	78.3	74.8	55.4

In calculating the above table, those species marked with an asterisk in the *Synonymic List* on pages 433 to 480 (whose occurrence in Malaya is doubtful), have been omitted from consideration. A further disparity, due to additions made since this table was calculated, does not significantly affect the results.

**CLASSIFICATION OF THE MALAYAN SPECIES OF BUTTERFLIES
ACCORDING TO EXTRA-MALAYAN DISTRIBUTION**

	Total Malayan Species in the Family	Indo- Chinese (Not found south of Singapore)	Malaysian (Not found north of Tavoy)	Oriental (Found north of Tavoy and south of Singapore)	Malayan "Ende- mics" (Found only between Tavoy and Singapore)	Other distrib- utions
Papilionidae ..	44	6	12	26	—	—
Pieridae ..	44	6	10	28	—	—
Danaidae ..	34	4	10	20	—	—
Satvridae ..	53	13	18	22	—	—
Amathusiidae ..	25	2	14	9	—	—
Nymphalidae ..	140	12	43	85	—	—
Libytheidae ..	1	—	—	1	—	—
Riodinidae ..	16	3	7	6	—	—
Lycaenidae ..	332	25	120	171	9	4
Hesperiidae ..	209	27	55	124	2	—
Total ..	898	97	289	492	11	4
In percentages ..	..	10.8	32.2	54.8	1.2	0.5

The Malayan "Endemics" are *Miletus heracleion*, *Arhopala johoreana*, *A. kurzi*, *A. myrtilina*, *A. agamemnon*, *A. cardoni*, *A. amnon*, *Horaga araotina*, *Deudorix elioti*, *Bibasis tuckeri* and *Platynia klanga*.

The "Other distributions" are *Celastrina akasa*, *C. singalensis* and *Nacaduba calauria* (all Ceylon and Malaysia), and *N. berenice* (Ceylon, S. India and S. Burma to Australia).

The species marked with an asterisk in the Synonymic List on pages 433-480 (whose occurrence in Malaya is doubtful), have been omitted from consideration (see also p. 30).

to the primeval forest, where they are represented by comparatively few individuals, while the secondary plant associations are frequented by large numbers of individuals of a relatively few widely distributed species.

Nearly 85 per cent. of the Malayan butterfly species occur also in the neighbouring islands of Sumatra or Borneo or both, while a small minority have reached the Peninsula from the north and are not found south of Singapore. Many Malayan species are distributed from Ceylon and India to the Philippines and Celebes. We can, in fact, recognise three distinct groups of species in the Peninsula :

(i) The forms of *Indo-Chinese* origin which have arrived from the north since the final separation of the Peninsula from Sumatra. These constitute about 11 per cent. of the Malayan Rhopaloceros species, and some of them have not yet passed south of North Kedah.

(ii) The *Malaysian* species (about 32 per cent. of the total), which occur also in the Large Sunda Islands, and are not yet found north of Tavoy in south Burma. Some of these species range to

the Papuan Region, and, indeed, possibly a few of them had their origins east of Weber's Line.

(iii) The widespread *Oriental* species which range from India and Burma to Malaysia, and, in some cases, extend also to Ceylon, the Philippines and Celebes. These comprise about 55 per cent. of the total species.

In addition, there are a few rare species (less than 2 per cent.), which are known only from the belt bounded by Tavoy in the north and Singapore in the south. It is probable, however, that most of these will be found also in Burma or in one or more of the Large Sunda Islands.

In general, the species which are most abundant in Malaya are those with the widest extra-Malayan distribution. In all families the commonest species are those ranging from Ceylon and India to Java and even further eastwards. As a group, the Indo-Chinese species are the rarest, and a large proportion of them (nearly one half) are confined to altitudes above 2,500 feet in Malaya proper.

For some interesting observations on the distribution of butterflies in the Malay Archipelago, the important contribution *De Soort als Functie van Plaats en Tijd* by Toxopeus (1930) should be consulted.

Plant Zones in Malaya

In the equatorial regions the flora is not divided into a mosaic of well differentiated plant associations such as is found in temperate regions. The keynote is uniformity, and neither in plants nor animals are there innumerable species with small and restricted habitats. Of course, close study by botanists has revealed some difference in forest types not apparent to the layman, but, in general in the Malay Peninsula, there can be recognised only four plant associations which have any significance as far as the distribution of Lepidoptera is concerned. These associations are considered below. An excellent account of the plant associations in the Archipelago is to be found in Merrill (1945).

(1) THE MANGROVE ASSOCIATION

In sheltered parts of the west coast of Malaya (more rarely on the east coast), and especially near the mouths of rivers, mangrove forests occur and often extend inland to a depth of several miles. This plant association is remarkable for the comparatively few species which comprise it, and the dominant species are trees belonging to the family Rhizophoraceae, whose stilt-like roots are exposed at low tide. Monkeys, crocodiles and the curious walking fish (*Boliophthalmus* and *Periophthalmus*) are characteristic animals of these forests. The mangrove areas in Malaya are inhabited by comparatively few species of butterflies, but *Danaus affinis* and *Rapala drasmos* appear to be entirely confined to this association, while *Idea leuconoë*, *Euploea phaenareta*, *Nacaduba pavana* and *Suastus gremius* are also characteristic.

(2) THE LOWLAND OPEN COUNTRY ZONE

This zone must be taken in its widest sense to include all cleared areas such as gardens, coconut plantations, rubber estates, roadsides, and deserted clearings reverting to secondary forest. When cleared land is abandoned in Malaya the course of its eventual regeneration to primary forest follows a standard pattern. The rank and coarsealang grass (*Imperata cylindrica*) first appears and holds the field to the exclusion of all other vegetation. Practically no butterflies are associated with this phase. In the course of a few years thealang is gradually replaced by other grasses and low-growing shrubs and, usually, leguminous plants are prominent. Many of the plants characteristic of the early stages of reversion are introductions from other tropical regions and, among these, the sensitive plant (*Mimosa pudica*), *Asclepias curassavica* and *Lantana aculeata* may be particularly mentioned. These introductions flower readily, and the flowers of *Lantana*, with their peculiar acrid odour, are especially attractive to butterflies.

It is estimated that the complete reversion of cleared land to true primary forest takes not less than about 250 years.

Between 110 and 120 species of Malayan butterflies can be regarded as pertaining to the secondary growth associations; a few of these occur also in primary forest, and others may be found rarely on the forest edge. Most of these secondary growth butterflies are widely distributed species which are found throughout the Oriental region. Among them may be mentioned *Atrophaneura aristolochiae*, *Papilio polytes*, *P. memnon* (the last two especially in the neighbourhood of gardens and villages where *Citrus* is cultivated), *Catopsilia* species, *Eurema hecabe*, *Danaus chrysippus*, *D. genutia*, *Ypthima ceylonica*, *Lethe europa*, *Mycalopsis mineus*, *Melanitis leda* (near villages), *Elymnias hypermnestra*, *Amathusia gunneryi* (the last two in coconut plantations), *Precis* species, *Neptis hylas*, *Lampides boeticus*, *Nacaduba dubiosa*, *Zizina otis*, *Udaspes folus*, *Erionota thrax*, *Unkana ambasa*, *Hidari irava*, and *Pelopidas mathias*.

In Sumatra and Java secondary plant associations are a feature of the highlands, but in the Peninsula there is comparatively little land in the course of reversion at high altitudes, and it is only within the last decade or so that secondary growth has become established at Cameron Highlands. It is desirable that detailed information should be forthcoming regarding the distribution of butterflies in such country in Malaya.

(3) LOWLAND FOREST

In this book the 2,500 feet line is taken as the upper and lower limit for the lowland and montane forest zones respectively. At this altitude the mean temperature is just over 70° F., as against 80° F. on the plains, and the annual rainfall exceeds the 90-100 inches of the plains. Here, also, differences in plant life are apparent to the casual observer, and it is approximately at this altitude that tree ferns are first in evidence.

The butterfly fauna is more or less homogeneous from the lowlands up to about 2,500 feet in primary forest, and it is in this zone that the vast majority of the species occur. Quite typical denizens of the lowland forest are the large, skulking Amathusiidæ, with lustrous blue or purple upperside and the underside resembling a dry or decayed leaf. Nearly all the Papilionidæ are forest dwellers, and among the Nymphalid genera associated with this zone may be specially mentioned *Ariadne*, *Terinos*, *Cethosia*, *Chersonesia*, *Tanaecia*, *Euthalia* and *Polyura*. Among the characteristic Lycaenid genera of the zone are *Allotinus*, *Jamides*, *Nacaduba* and *Arhopala*. *Iambrix*, *Koruthaialos*, *Notocrypta* and *Plastingia* are Hesperiid genera whose members are found mostly in lowland forest.

(4) HIGHLAND FOREST

The highland or montane zone in Malaya includes all land above 2,500 feet. As the altitude increases the tall forest is gradually replaced by more stunted vegetation which becomes lower and more scrubby at high elevations. Pitcher plants (*Nepenthes*) may appear in some profusion at altitudes above 4,000 feet, and at 5,000 feet and above, in some localities, the forest may take on the character of the English woodland and the forest floor be carpeted with the Malayan Hill Violet (*Violeta serpens*) and the golden balsam (*Impatiens oncidoides*).

With the exception of *Delias hyparete*, and, very occasionally, *D. aglaja*, all the species of *Delias* are restricted to the highland forest zone, as is practically the whole of the large Lycaenid genus *Celastrina*. Otherwise, it is exceptional for the whole of a genus to be montane in distribution, and it is only an odd species whose range is so restricted. Among the characteristically montane species in Malaya are *Chilasa agestor*, *Papilio iswaroides*, *Danaus sila*, *Lethe verma*, *Mycalesis anaxias*, *Polygonia canace*, *Parathyma cama*, *Limenitis daraxa*, *Sephisa chandra*, *Dodona* species, *Heliophorus* species, several *Pratapa* species, *Rapala abnormis*, about half the *Hasora* species and *Polytremis eltola*.

The Pierid *Ixias pyrene* has a subspecies in the mountains of Malaya which is distinct from that found on the plains, while *Delias georgina* is remarkable in that distinct subspecies occur on several isolated massifs. It is unusual, however, for representatives from subsidiary ranges or isolated peaks to differ from the corresponding forms flying on the main range.

Occasionally, lowland and submontane species (especially females) may be encountered in the highland zone, but they are usually casual visitors or migrants moving across country. These latter usually follow fairly definite lines and traverse a range of hills at certain points.

The most accessible collecting localities where montane species may be obtained are :—Kedah Peak (Gunong Jerai) in Kedah, the Larut Hills above Taiping in Perak, and Fraser's Hill and Cameron Highlands in Pahang. Although Penang Hill does not much exceed 2,700 feet,

there are a few species characteristic of the highland forest zone to be found there. We know of no montane species occurring on Gunong Raya (2,885 feet) in Pulau Langkawi.

KEDAWI

For the specialised area in north Malaya comprising the Langkawi Islands, Perlis and that part of the state of Kedah north of the Kedah River, the name *Kedawi* has been employed (Corbet, 1941a). In this area occur some thirty species of butterflies that are not otherwise found in Malaya, and, of this number, less than one third are found in Sumatra or Borneo. They are, in fact, mostly Burmese butterflies that have not passed the southern climatic barrier.

Furthermore, there occurs in Kedawi a number of species which are represented by subspecies distinct from those in Malaya proper. This is particularly the case in the Lycaenid genus *Arhopala*, of which the

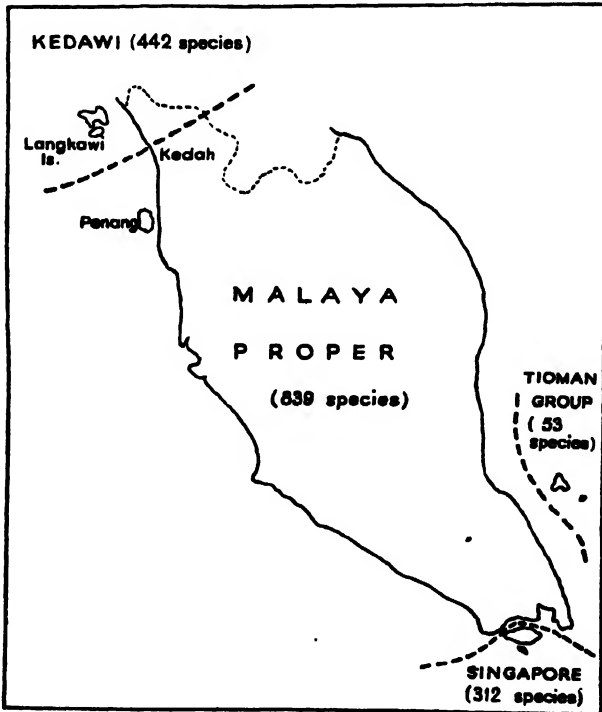


Fig. 9. Map illustrating the zoogeographical divisions in Malaya. The numbers shown refer to the number of species of butterflies already recorded from these divisions. It is certain that very many more species occur on the islands of the Tioman group.

Kedawi representatives are more nearly akin to the Burmese subspecies than to the truly Malayan forms. One butterfly, *Lebadea martha*, has a well differentiated race in the Langkawi Islands, another on the mainland in north Kedah, and a third in Malaya proper.

As a general rule, the forms from the Langkawi Islands are more widely differentiated from the races from Malaya proper than are those from north Kedah and Perlis. Of the 326 species known from the Langkawi Islands 42 occur in forms which are distinct from those found in Malaya proper.

A somewhat remarkable feature of the Kedawi butterflies is that a few species which fly on the plains in this area are more or less restricted to the mountains in Malaya proper, and among these may be mentioned *Chilasa mahadeva*, *Lamproptera curius*, *Ragadia crisilda*, *Euthalia lepidea*, *Celastrina cyma*, *Arhopala ijauiensis* and *Marmessus scaeva*. There are a few species also which fly in secondary growth in Kedawi, although essentially primary forest butterflies in Malaya proper. Such is the case with *Atrophaneura coon*, *Lebadea martha* and *Arhopala ijauiensis*.

Both the butterflies and plants of the granite massif known as Kedah Peak (nearly 4,000 feet) pertain to Malaya proper and not to Kedawi.

THE TIOMAN GROUP OF ISLANDS

The only other part of Malaya which is inhabited by butterfly species not found on the Peninsular mainland and by well differentiated subspecies is the Tioman group of islands, off the east coast of Pahang and Johore. Pulau Tioman is the largest island of the group, and, of the rest, Pulau Aor alone is of any size. During the monsoon season from November to February, the islands are practically isolated, and, at other times, they are but little visited from the mainland. Gunong Kajang (3,383 feet), on Pulau Tioman, is covered with primary forest, but it is probable that most of the island is now under secondary growth.

Of the 53 species so far known from Pulau Tioman, two or three are not found in Malaya proper or Kedawi, and 18 are represented by distinct subspecies. According to a superficial examination of some specimens from Pulau Aor, it appears that this island may have a number of races distinct from those from Tioman. It is almost certain that two or three hundred species of butterflies are represented in the islands of the Tioman group.

The Malayan species restricted to Pulau Tioman are *Celastrina aristinus* and *Jamides aratus*. *Danaus juvena* is practically confined to the Tioman group, although occasional specimens are taken on the east coast of Malaya.

SINGAPORE ISLAND

Several species of butterflies (among which may be mentioned *Pieris canidia*, *Precis hedonia* and *Pratapa dominus*) are practically confined

to Singapore Island as far as Malaya proper is concerned, and the Singapore race of *Polyura hebe* is distinct from that from the mainland. It is probable also that a number of weak races of Lycaenidae occur on Singapore Island.

No less than 368 species of butterflies have been recorded from the Island, but 56 of these have not been found during the last thirty years.

MIGRATION

A few species of butterflies are migratory on occasion; some of these have been observed in movement in large numbers over land, and a few have been seen far out at sea. Both Captain James Cook and Lieutenant William Bligh (when in command of the "Bounty") reported butterflies in flight off the Atlantic coast of South America. There are comparatively few records of butterfly migration on any scale in Malaysia. Among the Oriental species known to possess migratory instincts may be mentioned *Atrophaneura aristolochiae*, *Papilio demoleus*, *P. polytes*, *Graphium agamemnon*, *Delias aglaja*, *Catopsilia pyranthe*, *C. pomona*, *Appias albina*, *A. paulina*, *Hebomoia glaucippe*, *Danaus genutia*, *D. hamata*, *Euploea mulciber*, *Phalanta phalantha*, *Cirrochroa emalea*, *Vanessa cardui*, *Hypolimnas misippus*, *H. bolina*, *Lampides boeticus*, *Deudorix epijarbas*, *Hasora chromus* and *Badamia exclamationis*.

The causes of the migratory flights are not known, but it will be noticed that most of the species listed above are in Malaya secondary growth butterflies which are widely distributed outside the Peninsula. It has been suggested by Corbet (1941a) that the phenomenon owes its origin to the continual necessity on the part of secondary growth butterflies to discover and colonise new areas of secondary growth, at more or less the same stage of development, in order to ensure a continuous supply of the necessary larval food plant. Allusion has been made already to the changing flora in cleared areas reverting to forest, and colonies of butterfly species whose larvae feed on such open country plants as low-growing legumes would be in danger of extinction when increased shade caused the disappearance of their food plants if the adults were unable to seek new areas.

There are comparatively few records of large movements of butterflies in Malaya. The more important are mentioned below.

J. G. Koenig noted that some specimens of "the *Papilio argenor*" were driven on board the ship "Bristol," by violent rain, on 14th to 16th September, 1778, when it was delayed off the Sembilan Islands (off south Perak) by east and south-east winds. From Koenig's poor description, it is difficult to decide if the butterflies were, in fact, *Papilio memnon* or another species.

E. Gallois observed a cloud of butterflies which passed a steamship in the Straits of Malacca in the late afternoon of 24th March, 1907. The butterflies were in rapid flight a little above the surface of the sea,

and the ship became covered with them. Gallois believed the cloud contained only a single species which, from the six specimens preserved, was identified as the Sumatran race of *Delias aglaja* (Le Cerf, 1912).

A. R. Sanderson (Poulton, 1922) reported a migration of *Delias* species (*ninus* and *acalis*), accompanied by species of *Dysphania* (Geometridae) and a species of Zygaenidae, on Bukit Kutu, Selangor, in March, 1920. The insects moved from one valley to another in the evening and back again in the morning.

A large swarm of moths, containing many species, and mostly Agrotids, was seen proceeding westwards in the Straits of Malacca in the afternoon of 29th January, 1924. Among the specimens collected on the s.s. "van Wijck," from which the movement was observed, was a single example of *Hasora chromus*. (L[eeuwen], 1924.)

Cardon (1927) remarked a southward movement of *Delias aglaja* on Singapore Island during the day sometime before 1926; the butterflies were not in swarms but were flying singly.

A mass migration of *Catopsilia pomona* was witnessed in Upper Perak, between Kenering and Lawin, near Lenggong, on 26th May, 1926, when "thousands and thousands" of butterflies were seen. A few individuals of *Catopsilia pyranthe* and *C. scylla* were also present among the migrating hosts, and the movement was still in progress on the following day. (Cardon, 1927.)

A movement of large numbers of *Catopsilia pomona* from Pahang, across the Ginting Simpah Pass, into Selangor was seen in early June, 1930, by several observers. The movement was continued for several days, all the butterflies flying along the road some 10 to 15 feet from the ground in the same westerly direction. A flight of thousands of *Eurema hecabe* proceeding westwards along the east coast road in Pahang was witnessed by N. C. E. Miller in June, 1933 (Williams, 1930).

(Basic Literature: Williams, 1930.)

CHAPTER V

THE WING PATTERN

Pigments

THE pigments which have been identified up to the present on the wings of butterflies fall into four classes.

(a) *Pterines*, which are uric acid derivatives formed by the insects themselves, and not derived from the food plants. They are widely distributed among the Pieridae, and, doubtless, they occur also in other families. They were first detected in *Pieris brassicae* by Hopkins (1895), and Schöpf and Wieland and their associates have since carried out detailed investigations into the chemical nature of *leucopterin* (the white wing pigment in *Pieris* species) and *xanthopterin* (the yellow pigment in *Gonepteryx rhamni*).

(b) *Anthoxanthins* are non-nitrogenous plant pigments, from white to yellow in colour, and of comparatively rare occurrence in animals, which cannot manufacture them, but may derive them from their food. Although widely distributed in Lepidoptera, they are usually found mixed with other pigments. Anthoxanthins (which are hydroxy-derivatives of flavone, flavonol, xanthone and related compounds), often occur in plants in the form of their glucosides, and, when treated with alkali, they give a yellow or reddish colour. Thus, exposure of a butterfly to the fumes of strong ammonia results in the formation of a yellow colour when an anthoxanthin is present. When the anthoxanthin is itself of a deep yellow colour, or is masked by the presence of another pigment, it can be extracted by soaking the wings in ethyl acetate for 48 hours, filtering, and then shaking the filtrate with sodium carbonate solution, when the appearance of a deep yellow colour indicates the presence of an anthoxanthin.

As far as the Malayan Papilionidae are concerned, anthoxanthins are present only in the genera *Graphium* and *Lamproptera*, being absent from the other four. *Gandaca harina* is the only Malayan Pierid with this pigment. Anthoxanthins are present in some genera of Satyridae, Riodinidae, Lycaenidae and Hesperidae, but appear to be absent from Danaidae, Amathusiidae, Nymphalidae and Libytheidae.

(c) *Red Pigments*. The five types of red pigment which have been distinguished on the wings of butterflies are distributed as shown in the table.

Our knowledge of these red pigments is almost entirely due to Ford who found that the classification of the Papilionidae on a chemical basis accorded almost completely with that based on structural characters.

DISTRIBUTION OF RED PIGMENTS ON THE WINGS OF MALAYAN BUTTERFLIES

Type of Red Pigment	Group or genus of Rhopalocera where found	Solubility in Hot Water and Dilute Alkalus	Changed to Yellow by Hydrochloric Acid and Restored to Red by Ammonia	Murexide Test for Uric Acid and its Derivatives
A	<i>Troides</i> (body only) <i>Atrophaneura</i> <i>Graphium</i> (widely distributed in Lepidoptera, and especially in Zygaenidae, Arctiidae and the Catocalini tribe of Agrotidae)	Very slight	Yes	Negative
B	<i>Papilio</i> (not detected outside of the Papilionidae)	Insoluble	No	Negative
C	<i>Vanessa</i> group	Great	No	Negative
D	<i>Delias</i> (except the <i>aglaya</i> group)	Great	Yes	Positive
E	<i>Delias aglaya</i> , <i>D. acalis</i> and <i>D. nms</i>	Great	No	Positive

It is, however, a matter of no little interest that the sole exceptions to the rule that the red colour in the genus *Papilio* is due to pigment B are found in *Papilio rumanzovia* Eschscholtz and *P. daphobus* L., which species appear to replace *P. memnon* in the Philippines and Moluccas respectively.

From the table it will be observed that the superficially similar colour effects produced in the model and mimic in certain mimetic associations in the Papilionidae are due to the presence of quite dissimilar chemical substances.

(d) *Melanins*.—The black and blackish brown colours which are of such general occurrence on butterflies' wings are due, in a large measure, to the presence of melanins. These are polymerisation products formed by the oxidation of the colourless amino-acid *tyrosine* by the enzyme *tyrosinase*, which is widespread in nature, and occurs, for example, in beets and potato tubers. (The formation of melanin from tyrosine by treating this substance with a watery mush of beet or potato and leaving it to stand for a few hours is a simple experiment which can be carried out in a test-tube or tumbler.)

It appears that the restriction of black markings on lepidopterous wings is due, usually, if not always, to the localisation of the amino-acid and not to that of the enzyme.

Structural colours.—In the majority of Lepidoptera, the wing colours are due to pigments such as those mentioned above, but some butterfly species display bright metallic shades of blue, purple and green, and these "interference" colours are due to a physical phenomenon. They are of rare occurrence in the female sex. The scales on the metallic green upper surface of the males of *Jamides abdul* and of *Arhopala eumolphus* and

its allies are purple by transmitted light, while the scales from the lustrous purple male of *Drina manea* are yellow.

(Basic Literature: Ford, 1941, 1942, 1944a, 1944b, 1947.)

Polymorphism

It is a fairly general rule in butterflies that the sexes show differences, not only in the shape of the wings, but also in the wing pattern. In some cases, these differences are so striking that the old authors described the two sexes as distinct species. This phenomenon is termed *sexual dimorphism*.

In addition to this, there are butterflies in which one or both sexes occur in two or more very distinct forms, which are not connected by intermediates. As far as Malaya is concerned, the outstanding examples of such *dimorphism* or *polymorphism* are the following :

Chilasa clytia, in which both sexes occur in two forms, one (form *clytia*) resembling a species of *Euploea*, and the other (form *dissimilis*) resembling a bluish grey *Danaus* species.

Chilasa paradoxa, with the two dimorphic forms, in the two sexes, resembling *Euploea mulciber* and *E. diocletianus* respectively.

Papilio polytes, in which the ♀-form *cyrus* resembles the male, while ♀-form *polytes* resembles *Atrophaneura aristolochiae*.

Papilio memnon, with three female forms, of which two are tailless and reminiscent of species of the *Atrophaneura nox* group, while the third has a long spatulate tail and bears a general resemblance to *A. coon*.

Parathyma nefte, with two female forms which differ in colour, and are both totally dissimilar from the male.

Euthalia monina, with the sexes quite dissimilar and the male occurring in three more or less distinct forms which, however, are connected by intermediates.

Idrusia nyctelius, with two female forms, which resemble the male and female respectively of *Euploea diocletianus*.

In most of the examples given above, one or more of the polymorphic forms are mimetic (see below). It is a matter of considerable interest that, normally, polymorphic species of butterflies exhibit this phenomenon throughout the whole of their range, although the different forms may not correspond in different geographical areas. For instance, the female *Papilio polytes* is dimorphic in Malaya, but a third form occurs in Ceylon, while the female forms of *P. memnon* in Sumatra and Java differ from those found in Malaya to a greater degree than is usual between geographical races.

Usually, the polymorphic forms are not equally abundant, although it would be remarkable if one form were very much rarer than another.

It is customary to give names to these polymorphic forms, although it is still undecided as to whether any given form should be known by the same name throughout the range of the species, or whether a different name is required for the same form in each of its named subspecies.

The cases considered above are examples of the phenomenon termed *balanced polymorphism* by Ford (1945), and they are characterised by the different polymorphic forms being maintained at a fixed level as a result of a balance of natural agencies. In *transient polymorphism*, however, one of the forms is spreading through the population at the expense of the other polymorphs, presumably because it possesses certain advantageous characters. A good example of transient polymorphism in Malaysia is that of the two forms of *Danaus chrysippus* in North-east Sumatra. According to de Nicéville and Martin (1896), only the orange form *chrysippus* occurred there fifty to sixty years ago, but, since then, the form *alcippoides*, with white hindwing, has become increasingly abundant, and it is probable that it has entirely replaced the typical form. Much the same position obtains in Malaya as regards this species and *D. genutia*, both being represented only by forms with the hindwing white in Malaya proper.

Variation.—In addition to the occurrence in certain species of the clearly defined forms described under "Polymorphism," there is present in some species a type of variation in which the numerous deviations from the normal form are connected by all gradations. Examples of this graded variation are found in both sexes of *Eurema hecabe* and in the female of *Hypolimnas bolina*. It is undesirable that individual varieties of this nature should receive distinctive names, but this counsel of perfection has not been followed with regard to *H. bolina*, and certain Palaearctic species of Lycaenidae have suffered grievously in this respect.

The term *aberration* is applied to extreme cases of variation. In most Malayan species of butterflies they are of very rare occurrence. It is probable that these "sports," or *mutations* as they are called, arise as the result of some abnormal circumstance and their chances of survival and perpetuation are very small.

Gynandromorphs are individuals in which the characters of both sexes are present; usually, the wings on one side are typical of the male and on the other of the female sex. Such individuals are very infrequent in nature, and little is known regarding the structure of the genital organs of such specimens.

Seasonal Forms.—Allusion has been made already (page 23) to the occurrence of sharply differentiated wet- and dry-season forms of certain species of butterflies in the monsoon areas. In species of *Mycalesis*, *Melanitis* and *Precis*, the dry-season form is characterised by the more angulate wings and the cryptic pattern on the under surface; in the wet-season form the post-discal spots on the underside are fully developed. In Malaya, the dry-season forms appear as rare aberrations, except in

Kedawi where they are of regular occurrence during the comparatively dry period of the year from December to February.

In some species of *Jamides* and *Nacaduba*, dry-season forms are found in which the ground colour of the underside is more ochreous, and the interspaces between the transverse stripes are darkened. Such forms, however, are extremely rare in Malaya.

Subspecies (Geographical Races)

In the preceding chapter, attention was drawn to the fact that the conditions obtaining in Malaysia have been highly favourable to the formation of well defined geographical races (or subspecies, as they are usually termed), and, indeed, in most species of butterflies, it is found that each large island of the Archipelago has developed its own distinctive subspecies. Usually it is the case that the Neomalayan representatives closely resemble one another, and, in fact, in some species, they are not separable.

A feature of many of the Malay species of butterflies is that on the islands (or in other isolated faunal divisions), the representatives of the different species in a genus show a remarkable similarity in wing pattern. In such cases it is easier to identify the place of origin of an individual specimen than to determine the species; indeed, identification may depend entirely on primary and secondary sexual characters, and, in some cases, the females cannot be named with certainty with the information at present available.

One of the most striking examples of the several members of a single genus apparently showing the same response to the environment in each of the different faunal areas is found in the genus *Euploea* (Plate 23). The races from Ceylon are rather small, russet brown, and with distinct marginal and submarginal spots. The representatives from Sikkim have the forewing shining blue with discal and submarginal spotting: a deep shining blue forewing and prominent white submarginal spots on the hindwing are characteristic of the Burmese races, but in Neomalaya the blue colour is much reduced or even obsolete. The smaller Javanese races are more drab in appearance. The races from Paramalaya are remarkable for the dark wings and the prominent white submarginal spotting on both wings. Races from Luzon are distinguished by the prominent white subapical patch on the forewing and by the hindwing spots tending towards obsolescence. Forms from Celebes are characterised by the prominent white discal or post-discal markings present on both wings. Representatives from the Moluccas and New Guinea are dark brown above and unmarked or almost unmarked. The rather smaller races from Timor and Queensland are deep velvety black, with large and prominent white submarginal spots on both wings.

Also, in the *pelse* group of the genus *Tanascia*, the wing colour and

pattern are characteristic of the habitat rather than of the species. The Peninsular representatives are pale greyish ochreous brown, with the hindwing border whitish; the Sumatran races are a rich purple-brown, with the hindwing border washed with purple-blue; usually, the Bornean races are paler than the Sumatran, with the blue bordering on the hindwing less extensive, and the white helmet-shaped spots in spaces 2 and 3 on the forewing separated from the post-discal band. The few Burmese and Javanese forms in the *pelea* group are also distinctive.

In the large Lycaenid genus *Arhopala* the effect of the environment on the wing shape and colour is even more striking and is discussed on page 315.

Mendelism

Of the several types of variation considered in the foregoing pages, the occurrence of seasonal forms and geographical races is evidently due to the prolonged influence of environmental factors on the organism. Such variation is termed *phenotypic*, and its results are produced only after many generations.

On the other hand, the phenomena of sexual dimorphism and polymorphism, and of variation (in the sense we have used the term on page 41), are due to inherited characters, and are examples of *genotypic* variation.

The earliest published experiments on inherited characters were those carried out with sweet peas about the middle of the last century by a monk, Gregor Mendel, in the seclusion of a monastery garden at Brünn (now Brno). The science which has grown up around this subject is known as *Mendelism*.

Mendel found that when two individual plants showing a pair of contrasted characters (such as tallness and dwarfness, or red flowers and white flowers) were crossed, the original characters separated out in the F_2 , or second filial generation (that is the grandchildren), and remained segregated in subsequent generations; there was, in fact, no loss of these characters by blending. Inherited characters in plants and animals are controlled by paired genetic factors known as *genes*, one being acquired from each parent, and the genes are carried in the paired *chromosomes*, of which every body cell has a complete set in the nucleus. The genes are also present in the chromosomes of the male and female reproductive cells. Each of these cells, however, has only half the number of chromosomes present in the other body cells. When they unite, at fertilisation, the full number of chromosomes is restored, one half being derived from each parent.

As an example of the mechanism of this Mendelian type of inheritance, we may cite the result of one of Mendel's experiments with sweet peas in which tall plants were crossed with dwarf plants.

In the F_1 generation only tall plants were obtained, but crossings between these tall hybrids produced both tall and short plants in the ratio of 3 to 1 in the F_2 generation, and there were no intermediates in height. It was found, moreover, that while the dwarf plants bred true (giving only dwarfs), the tall plants, although outwardly similar, when crossed among themselves gave either only tall plants or tall and dwarf plants in the ratio of 3 to 1. Such pairs of contrasting genetic factors, giving rise in this case to tall and dwarf plants respectively, are termed *allelomorphs*.

From what has been said above, there is no obvious reason why a gene of constitution (TD) should give a tall rather than a dwarf plant; indeed, it might be expected that it would give a plant of intermediate height. The explanation is that the factor (T) for tallness is *dominant* and (D) for dwarfness is *recessive*, and, when both are present in the same germ cell, it is the dominant factor (T) which outwardly manifests its presence. A gene such as (TD) with both allelomorphs present, is termed *heterozygous* as distinct from the *homozygous* pairs (TT) and (DD). It is a curious fact that it is often difficult to obtain by breeding a pure strain of individuals which are homozygous with respect to the dominant gene.

Mendel found also that, when two or more pairs of contrasting characters are present in the same germ cell, they are inherited in the progeny independently of each other according to the same mathematical considerations. Mendel's laws are essentially true to-day, although they have been modified somewhat as a result of more extensive research. They apply equally well to animals and plants, and Fryer (1913) in Ceylon, and Jacobson (1909) in Sumatra showed that the relationships between the polymorphic female forms of *Papilio polytes* and *P. memnon* respectively could be explained on Mendelian lines. In these butterflies there appear to be male forms with a genetic constitution corresponding

THE PROPORTION OF FEMALE FORMS RESULTING FROM MATINGS OF <i>PAPILIO POLYTES</i> IN MALAYA						
Matings				♂	♀-f. <i>cyrus</i>	♀-f. <i>polytes</i>
♂ x ♀-f. <i>cyrus</i>	..	..	..	{ 1 2 1	1 1 —	— 1 1
♂ x ♀-f. <i>polytes</i>	..	..	..	{ 1 2 4	— 1 1	1 1 3

Table showing the proportion of female forms resulting from matings of *Papilio polytes* in Malaya.

to the female forms, but the associated wing patterns are not produced in the male sex owing to the presence of a sex-linked inhibiting factor.

According to Fryer's results in Ceylon, it would be anticipated that the possible matings of the *Papilio polytes* forms in Malaya would give the two female forms in the proportions shown in the table. In the case of this species, the mimetic ♀-form *polytes* is the dominant one. From the experimental standpoint, it must be remembered that the smaller the number of individuals involved, the greater is likely to be the disparity between the observed and expected results.

If we represent the genetic factors which give rise to the mimetic and non-mimetic forms by the symbols M and m respectively, the ♀-f. *cyrus* will have the constitution (mm), while the ♀-f. *polytes* will be represented by (mM) and (MM). The results of the possible matings can then be expressed as shown in the following table.

GENETIC CONSTITUTION OF THE MALES AND FEMALES RESULTING FROM MATINGS OF *PAPILIO POLYTES* IN MALAYA

(a) ♂ x ♀-f. <i>cyrus</i>				
Matings ♂ x ♀-f. <i>cyrus</i>	F ₁ generation			
	♂	♀-f. <i>cyrus</i> (mm)	♀-f. <i>polytes</i> (mM)	(MM)
(mm) x (mm)	1	1	—	—
(mM) x (mm)	2	1	1	—
(MM) x (mm)	1	—	1	—

(b) ♂ x ♀-f. <i>polytes</i>				
Matings ♂ x ♀-f. <i>polytes</i>	F ₁ generation			
	♂	♀-f. <i>cyrus</i> (mm)	♀-f. <i>polytes</i> (mM)	(MM)
(mm) x (mM)	2	1	1	—
(mM) x (mM)	4	1	2	1
(MM) x (mM)	2	—	1	1
(mm) x (MM)	1	—	1	—
(mM) x (MM)	2	—	1	1
(MM) x (MM)	1	—	—	1

Table showing Genetic constitution of the males and females resulting from matings of *Papilio polytes* in Malaya.

The clear-cut cases of polymorphism given on page 41 are probably all due to the operation of a single pair of factors in the germ cells, but, in such species as *Eurema hecabe* and *Hypolimnas bolina*, the variation is controlled by multiple factors, and the mathematical proportions of the

various forms among the progeny are much more complicated. Geographical races also differ by a large number of genetical factors, so that interbreeding between them results in the production of many intermediate forms. A case in point is that of *Elymnias hypermnestra*, in which numerous intergrades occur in northern Malaya in the area between the two very distinct subspecies *tinctoria* (Kedawi and northwards) and *beatrice* (Malaya proper). This gradation between two well-defined, but not geographically isolated, subspecies is termed a *cline* (Huxley, 1942), and, in the present instance, the representatives of *E. hypermnestra* in the "no-man's-land" south of the Sungei Kedah might be referred to as *E. hypermnestra* cl. *tinctoria-beatrice* instead of *E. hypermnestra discrepans* Distant. Such a usage of the term in nomenclature, however, is without sanction from the International Commission on Zoological Nomenclature, although it gives a clearer picture of the position than does the employment of a further subspecific name.

Little has been done in Malaya with a view to studying the genetical relationships of the polymorphic forms in the species exhibiting this phenomenon and the subject offers a profitable field for the amateur. Careful breeding experiments with larvae from known females of such species as *Papilio memnon*, *Catopsilia pomona*, *Euthalia monina* and *Idrusia nyctelius* could make a very welcome contribution to existing knowledge.

(Basic Literature: Ford, 1940.)

Mimicry

In a classic paper in 1862, after his return from the tropical forests of Brazil, H. W. Bates attempted to account for the superficial resemblance between certain butterfly species of quite dissimilar structure which had long been noticed. He supposed that certain widely distributed, common and conspicuous species, which possessed properties that made them distasteful to insectivorous animals, functioned as "models" for certain of the weaker and more palatable species of butterflies (and moths) in the same locality. There was, of course, no suggestion that this mimetic resemblance involved any conscious action on the part of the "mimics," and these "Batesian" mimics were, by hypothesis, comparatively rare and isolated species.

In 1879, F. Müller propounded his theory of "mimetic rings" in which he considered that the dominant distasteful forms gained an advantage by mutual resemblance in so much that this facilitated the education of their enemies by giving them fewer patterns to learn. The necessary wastage of life by which the education of inexperienced insectivorous animals is brought about is here divided between the various species in the mimicry ring, instead of being contributed by each member independently. By this means, it was suggested, predators of insects soon learn to associate certain colours and patterns with disagreeable tastes.

There are a number of mimetic associations in Malaya in which species of *Atrophaneura* (Papilionidae), *Delias* (Pieridae) and Danaidae serve as models, while the mimics are found among such diverse genera as *Papilio*, *Valeria* (Pieridae), *Elymnias* (Satyridae) and the Nymphalid genera *Hypolimnias* and *Idrusia*. Nevertheless, examples of mimicry are much less numerous in the Oriental Region than appears to be the case in tropical America and Africa. In a subject such as this there is a temptation to see mimicry where it does not exist, and it is unwise to suppose that a genus comprising a number of similar species constitutes an example of Müllerian mimicry, unless there is evidence of distasteful properties.

Models. In general, the species which serve as models are slow-flying butterflies, with brightly coloured wings, prone to display themselves conspicuously, and tough and tenacious of life. Many of the male Danaids, if seized in the fingers or otherwise alarmed, extrude feathery scent pencils at the anal end of the abdomen, and thereby disseminate a slightly nauseous-smelling scent. We have suggested that the distasteful properties may be due to substances derived from the larval food plant. The larvae of *Atrophaneura* feed on *Aristolochia*, of which some species, at least, contain alkaloids poisonous to man. The Asclepiadaceae, on which the Danaid larvae feed, may also contain toxic constituents, as it is known that *Asclepias curassavica* does. The *Delias* larvae feed on the mistletoes *Viscum* and *Loranthus*; *Viscum monoicum* contains a powerful narcotic poisonous to animals, and the powdered dried leaves are used as a substitute for strychnine and brucine in Calcutta.

The larvae of butterfly species which serve as models are often gregarious, at least in the early stages, and, although brightly coloured and conspicuous, may remain exposed on the leaves of the food plant during the day-time.

Carpenter (1941) has found that many butterflies bear evidence of attack by birds in the presence of beak marks on their wings. As would be expected on the basis of the mimetic theory, these beak marks are most numerous among the species which are believed to be distasteful and to serve as models in the mimetic associations. It is argued, therefore, that the individuals bearing the beak marks have been released after capture on account of their repellent properties. Although this is almost certainly true, it must not be overlooked that the slow-flying Danaids would be more liable to attack in any case.

Mimics. In most of the mimetic species in Malaya, it is only the rarer female sex which displays the mimetic pattern, and it is evident that a "palatable" butterfly moving slowly in the act of oviposition may stand a better chance of deluding a potential enemy by flying under false colours.

As a rule, the markings on the upper surface of the wings in the mimetic species are somewhat blurred and not sharply defined as in

the model, and, in some cases, the underside is cryptically coloured and harmonises with the surroundings. It is, therefore, only when the butterfly settles with open wings, or is in flight, that the deceptive pattern on the upper side is of any advantage. Most butterflies are not active for more than about six hours per day and so, for the greater part of their lives, they have to depend for safety upon the coloration of the under surface of the wings. In the case of distasteful species there is no necessity for such protection, and here the coloration of the underside is scarcely less striking than that of the upperside.

The butterflies classed as "Batesian" mimics are not known to possess distasteful properties, and, in this connection, it may be mentioned that specimens of *Elymnias* are among the first to become infested in neglected collections of Malayan butterflies.

Rarely in Malaya do mimetic species fly in precisely the same localities as their models, and where model and mimic *do* frequent the same localities (for example, *Danaus melaneus* and *Hestina nama*, and *Euploea diocletianus* and *Chilasa paradoxa* f. *aegialus*), the latter is such a faithful copy of the former, in flight, that experienced collectors may be deceived; usually, however, the deception is only momentary. Many mimics appear never to leave the shade of the forest, with its curiously deceptive light effects, and so a predatory bird has no opportunity of making a direct comparison between, say, *Euploea midamus* in the open and *Elymnias panthera* in the forest shade. Although, under usual circumstances, the mimics are slow and deliberate in flight, such species as *Chilasa paradoxa* and *Hestina nama* fly off in the strong manner typical of their respective families when alarmed.

A further interesting circumstance is that mimics exhibit the same geographical variation as their models, and, as a general rule, mimetic forms are not found outside the range of their models.

We give below a list of some of the more noteworthy mimetic associations found in the Malay Peninsula. The species in the list are confined to those which we ourselves have seen in flight in their natural environment.

MODELS		MIMICS	
<i>Atrophaneura varuna</i> ♀	<i>Papilio memnon</i> ♀-f. <i>butlerianus</i>
<i>Atrophaneura nox</i> ♀	<i>Papilio memnon</i> ♀-f. <i>esperi</i>
<i>Atrophaneura coon</i>	<i>Papilio memnon</i> ♀-f. <i>distantianus</i>
<i>Atrophaneura aristolochiae</i>	{ <i>Papilio polytes</i> ♀-f. <i>polytes</i> <i>Histia rhodope</i> (Zygaenidae)
<i>Delias singhapura</i> }	<i>Cyclosia pieridoides</i> ♂ (Zygaenidae)
<i>Delias baracasa</i> }	
<i>Delias aglaja</i> }	{ <i>Elymnias esaca</i> ♀ <i>Cyclosia pieridoides</i> ♀ (Zygaenidae)
<i>Delias ninus</i> }	

MODELS	MIMIC		
<i>Danaus chrysippus</i> }	{ <i>Elymnias hypermnestra tinctoria</i> ♀ <i>Hypolimnias misippus</i> ♀
<i>Danaus genutia</i> }			
<i>Danaus melanippus</i> }			
<i>Danaus hamata</i>	<i>Chilasa clytia</i> f. <i>dissimilis</i>
<i>Danaus aspasia</i>	<i>Valeria valeria</i> ♀
<i>Danaus agleoides</i> }	<i>Elymnias nesaea</i>
<i>Danaus vulgaris</i> }			
<i>Danaus similis</i> }			
<i>Danaus melaneus</i>	<i>Hestina nama</i>
<i>Danaus sita</i>	<i>Chilasa agestor</i>
<i>Ideopsis gaura</i>	{ <i>Graphium delessertii</i> ♀ <i>Cyclosia pieridoides virgo</i> . (Zygaenidae)
<i>Idea lynceus</i> }	<i>Elymnias kunstleri</i> ♀
<i>Idea jasonia</i> }			
<i>Euploea algea</i> }	{ <i>Chilasa slateri</i> <i>Elymnias kuenstleri</i> ♂
<i>Euploea eyndhovii</i> }			
<i>Euploea multiciber</i> ♂	{ <i>Chilasa paradoxa</i> f. <i>aenigma</i> <i>Elymnias casiphone</i> ♂ <i>Cyclosia midamia</i> (Zygaenidae)
<i>Euploea multiciber</i> ♀	<i>Elymnias casiphone</i> ♀
<i>Euploea midamus</i>	<i>Elymnias panthera</i>
<i>Euploea klugii</i>	<i>Chilasa clytia</i> f. <i>clytia</i>
<i>Euploea diocletianus</i> ♂	{ <i>Chilasa paradoxa</i> f. <i>aegialus</i> ♂ <i>Elymnias penanga</i> ♀-f. <i>penanga</i> <i>Idrusia nyctelius</i> ♀-f. <i>isina</i>
<i>Euploea diocletianus</i> ♀	{ <i>Chilasa paradoxa</i> f. <i>aegialus</i> ♀ <i>Idrusia nyctelius</i> ♀-f. <i>euploeoides</i>
<i>Cethosia biblis</i>	<i>Coryptilum rutilellum</i> (Tineidae)

A few of the forms included in the above list call for special comment. Of the three mimetic female forms of *Papilio memnon*, only ♀-f. *esperia* bears a passable resemblance to its supposed *Atrophaneura* model. The female of *Hypolimnias misippus*, which so closely resembles an orange species of *Danaus*, must certainly be regarded as a "Müllerian" and not a "Batesian" mimic, for its *Vanessa*-like larva is conspicuous, gregarious, remains exposed during the day, and probably feeds on a poisonous plant. The Zygaenid moths mentioned above are in the same case, for many of them exude a nauseous, frothy liquid when handled, and the conspicuously coloured larvae are gregarious and remain exposed. It is noteworthy that *Elymnias esaca* seldom flies at the same altitudes as its supposed models *Delias aglaja* and *D. ninus*,

and, according to Corbet's observation, the female of *E. esaca* in no way resembles the *Delias* species in flight.

Although *Papilio polytes* and *P. memnon* are now common butterflies in the neighbourhood of towns and villages, this is certainly due to the cultivation of citrus (the larval food plant), and, before the arrival of agricultural man, both species must have been rare forest butterflies.

Protective Resemblance

The mimetic associations described above cover comparatively few species. There are further devices, however, apparently of a protective nature, that may be observed in many other butterflies. One of these devices, which may be termed *deceptive coloration*, is found in many insects besides butterflies. In the latter it consists of a striking contrast between a brightly coloured upperside and a dull, dry-leaf-like under surface. Many butterflies with this type of wing pattern have a fast, erratic, but not sustained flight, and they sneak off into the undergrowth where they remain motionless, with wings closed, and harmonise so well with their surroundings that they disappear into them. Several butterflies, including the large Amathusiidae, come in this category, but the best example is the "Leaf Butterfly" (*Kallima paralekta*) in which the upperside is gaudily coloured with blue, orange and black (Plate 43, figure 135), the underside marked and coloured like a dry leaf: even the mid-rib and veins are indicated, and there are blotches similar to fungal growths and sometimes patches as though part of the leaf had rotted away. Although naturally wary, "Leaf Butterflies" may sometimes be seen exposing themselves conspicuously in sunny patches of forest, resting with wings fully expanded on living foliage; but, at a suspicion of danger, they revert to their skulking habits.

Certain species perform a remarkable vanishing trick in the course of their flight, but may be found settled on the underside of leaves, with wings fully expanded. The Nymphalid *Eulaceura osteria* and the Hesperiid species of *Celaenorrhinus* have been observed to behave in this manner. When settled in open spaces, many butterflies orient themselves with their wings closed so that they lean towards the sun and thereby throw a minimum amount of shadow.

The two large *Prothoe* species have a habit of resting on tree trunks, with wings closed and head pointing downwards. These butterflies have a large black eyespot representing a "false head" at the tornal angle of the hindwing beneath, and, were this seized by an enemy, the butterfly would have a chance of escaping with the loss of nothing more vital than an inconsiderable portion of the hindwings. Similarly, many species of Lycacnidae have a "false head" on the underside of the hindwings, which comprises, in the tornal area of each wing, a black, orange-crowned spot bearing one or more pairs of white or white-tipped tails. When these butterflies settle, the tails are very lively,

especially when wafted in a breeze, and the butterfly itself often accentuates their animation by a slight up and down movement of the hindwings. This "false head" then is the portion most likely to divert attention from vital parts.

Protective devices are not confined to the adult butterflies. Mention has been made already in this chapter of the distasteful properties of the larvae in certain species. Some larvae discharge an acrid-smelling fluid when disturbed, and, in many species of *Lycaenidae*, the larvae are protected by the ants with which they are associated. As a rule, however, the larvae of butterflies are rendered inconspicuous by their close resemblance to surrounding objects; usually, they are green and harmonise with the foliage of the food plant. The pupae also obtain protection by their shape and coloration.

CHAPTER VI

DUPLEX SPECIES AND THE ORIGIN OF SPECIES

THE reader may have remarked that, so far in this book, the term *species* has not been very precisely defined. The reason for this is that the species-concept is by no means as simple as was formerly thought, and, indeed, in the case of the Rhopalocera, it cannot be completely defined in the absence of an understanding of geographical distribution and the formation of local races, or subspecies.

In the last century the position was simple enough, for every reasonably distinct geographical race was treated as a separate species and named accordingly. Although this state of affairs was not wholly disadvantageous from the nomenclatural standpoint, it was responsible for serious errors regarding endemism* and geographical distribution. For instance, Celebes representatives of many widely distributed Oriental butterfly species are often superficially very different from those found in Malaysia, and, accordingly, the older authors attributed a much higher degree of endemism to Celebes than is indeed the case.

Although Distant suspected that many of his Malayan "species" were merely geographical races of more widely distributed insects, it was Rothschild (1895) who first clearly demonstrated that the myriad butterfly forms of the Malay Archipelago were reducible to a manageable number of species. This simplification of the species-concept brought further complications, however, and it is noteworthy that many recent works on entomology do not attempt the definition of a species. Until quite recently, it was generally agreed to regard as conspecific only those forms judged capable of interbreeding among themselves, but, apart from the impossibility of proof in almost all cases, this view of the species-concept is of little assistance in dealing with the existing situation in the Malay Archipelago. In *The Origin of Species by means of Natural Selection*, Charles Darwin wrote "In determining whether a form should be ranked as a species or variety, the opinion of naturalists having sound judgment and wide experience seems the only guide to follow." This was written nearly a hundred years ago and, I think, in a large measure, it expresses the position in systematic zoology to-day.

Sympatric and allopatric forms. Animal forms which occur together in the same geographical area are termed *sympatric*, by contrast with

* An *endemic* species is one confined to a definite geographical area, such as a particular island. Species endemic to the Malay Peninsula, for instance, are not found outside Malaya. As the terms "endemic" and "endemism" are often used in a wider sense, the word *autochthonous* is frequently employed in place of the former term in its more restricted sense as defined above.

allopatric forms which are not found together and are mutually exclusive. Usually (but not invariably), there is no difficulty in assessing the specific status of sympatric forms, for further study should show whether or not intermediate forms exist, and, in their absence, it is usually safe to decide against conspecificity. It is with allopatric forms that difficulties arise ; it can often be only a matter of opinion whether a Celebes form, for example, is to be regarded as conspecific or not with a widely distributed and closely related form inhabiting the western part of the Archipelago. Our own view is that conspecificity should be assumed whenever possible. As Mayr (1942) has pointed out, the gaps between sympatric forms are absolute, while those between allopatric species are often gradual and relative.

Duplex species. Already it has been shown how the repeated subsidences and emergences of the Malaysian lands during the Pleistocene have been responsible for the development of a remarkable multiplicity of closely allied species in a number of Lycaenid genera (page 25), and this picture of species formation requires no further elaboration. This phenomenon is not confined to the Lycaenidae, however, and further examples are found in such genera as *Amathusia*, *Tanaecia* and *Euthalia*. It remains to draw attention to several pairs of *duplex species* among the Malaysian Rhopalocera in which the rare species, with more restricted range, almost certainly owes its origin to the separations and reunions of the larger land masses in Sundaland during the Pleistocene. Among these may be mentioned the following :—

{ <i>Troides amphrysus</i> :	Mergui Archipelago to Malaysia.
{ <i>T. cuneifera</i> :	Malaya, Sumatra and Java.
{ <i>Papilio helenus</i> :	Oriental Region, except Celebes.
{ <i>P. iswaroides</i> :	Malaya and Sumatra.
{ <i>Eurema hecabe</i> :	Throughout the Aethiopian and Indo-Australian Regions.
{ <i>E. ada</i> :	Malaysia.
{ <i>E. andersonii</i> :	Ceylon and India to Malaysia.
{ <i>E. lacteola</i> :	Malaysia.
{ <i>Idea jasonia</i> :	Ceylon and India to Malaysia.
{ <i>I. lynceus</i> :	Neomalaya and Nias.
{ <i>Heliophorus epicles</i> :	India and China to Formosa and Malaysia.
{ <i>H. ila</i> :	Malaya and Sumatra.

In addition to the above pairs of similar species in Malaya and Sumatra, further pairs of sympatric species are found in the belt between south Burma and north Malaya ; in each of these, one species is essentially Malaysian in distribution, while the other is confined to the Asiatic mainland. A good example is found in the *Euploea doubledayi*-complex, which comprises *E. doubledayi*, occurring from Sikkim to Kedawi, and *E. cyndhovi*, which is almost entirely Malaysian, although a few individuals have been taken as far north as south Burma. *E. doubledayi* becomes

progressively rarer in Malaya proper on proceeding southwards from Kedah, and, indeed, it is not known south of Selangor ; in the same manner, *E. eyndhovii* becomes increasingly scarce from Kedawi to south Burma. The differences between these two butterflies are comparatively small so that, if it were not known that they fly together and that no intermediates have been found, a systematist would have little hesitation in placing them as geographical races of a single species.

As further examples of duplex-species pairs in Kedawi, the following may be mentioned :—

{	<i>Euploea klugii</i> :	Ceylon and India to Kedawi.
	<i>E. leucostictos</i> :	South Burma and through the Malay Archipelago to Fiji.
{	<i>Euthalia cocyus</i> :	Burma to Kedawi.
	<i>E. godartii</i> :	South Burma to Malaysia.
{	<i>Tagiades litigiosa</i> :	Ceylon and India to the Langkawi Islands.
	<i>T. ultra</i> :	South Burma, Malaya, Sumatra and Nias.

It is not difficult to surmise how these pairs of species came about : when the present Peninsula was separated from the Asiatic continent by an arm of the sea, *Euploea doubledayi* and *E. eyndovii* must have been the Asiatic and Malaysian representatives respectively of a single widespread species, and the separation of Asia from Malaya was sufficiently prolonged for there to be no interbreeding when the reunion took place. Since then, there has been a gradual infiltration of one form into the territory of the other, and, it can hardly be doubted, this movement is still in progress. In the case of the *Euploea* and *Euthalia* species, it is evident that the movement northwards is proceeding more rapidly than that in the opposite direction for, as yet, *Euploea klugii* and *Euthalia cocyus* have not been found south of Kedawi.

Cases such as those outlined above contribute in no small measure to the difficulty of defining a species. During the last glaciation, and when the present Peninsula was separated from the Asiatic mainland by a sea channel, a modern systematist (had he existed), would have regarded the Burmese *Euploea doubledayi* and the Malaysian *E. eyndovii* as constituting a single species ; and he would have been correct in so doing, although at some time preceding the reunion of Malaya with Asia the two butterflies must have reached the stage when interbreeding was no longer possible. In this particular case, as in that of the other pairs mentioned, there is no difficulty regarding nomenclature, for each of the forms in the duplex under discussion must be regarded as a distinct specific entity, and there is no doubt regarding the names to be employed. Instances can be cited, however, in which considerable uncertainty attaches to the delimitation and nomenclature of a pair of duplex species. The *Euploea algea* complex is a case in point.

E. algea is a widespread species ranging from Sikkim through the Archipelago to Oceania, although, curiously enough, it has not been

found in Formosa. Throughout its range, it gives rise to well-defined geographical races, and nowhere is there any doubt regarding its identity. Only in Palawan is there any difficulty as regards nomenclature. In this island, two forms of the *E. algea*-complex occur, either of which would be considered as the Palawan race of *E. algea* were the other not present. In one of these, the upperside of the forewing is

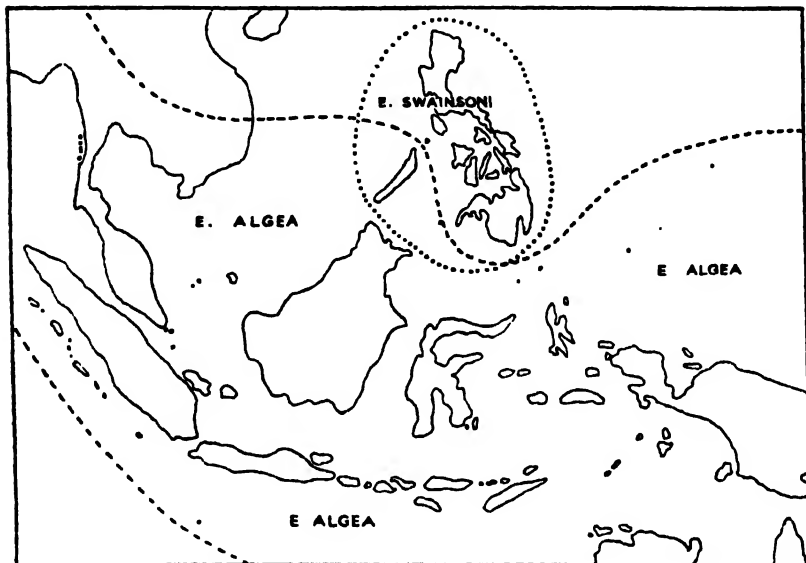


Fig. 10. Distribution of the *Euploea algea* Complex.

The island of Palawan, north-east of Borneo, has been twice colonised by *E. algea*, first from Malaysia and then from the Philippines, and the presence of two representatives of the *E. algea* complex on Palawan necessitates regarding *E. swainsoni*, the Philippine form, as a species distinct from the more widely distributed *E. algea*.

almost immaculate, as in the Malaysian races of *E. algea*, while the other has white marginal and submarginal spots on both wings, as in the Philippine race of the *Euploea* species. It seems evident that the Malaysian form is the older as far as Palawan is concerned (for this island lies on the Sunda Shelf and formed part of Sundaland), and the Philippine representative has reached the island in more recent times. The absence of any intermediate forms indicates that no interbreeding occurs, and the problem of the specific names to be employed is not easily settled. It is desirable, and even essential, to give two reproductively isolated forms separate specific names, and the course adopted by Corbet (1943a) was to refer the Malaysian form in Palawan to *E. algea* (Godart) and to regard the Philippine form, both in the Philippine Islands and in Palawan, as constituting a second species for which the oldest valid name is *E. swainsoni* (Godart). On nomenclatural grounds, this course may not

appear very elegant, as it leaves the Philippine Islands without a denominated representative of *E. algea*. Had the Philippine form not reached Palawan, there would have been no difficulty, and, in spite of the two neighbouring races having passed the stage of potential interbreeding, the Philippine *swainsoni* would have been regarded as a subspecies of *E. algea*.

In the case of any widespread species with a series of insular races from Ceylon through the Archipelago to New Guinea, it is impossible even to guess how far interbreeding between neighbouring races may be possible, and it may be taken as certain that the races which are widely separated geographically are also reproductively isolated. In fact, few modern systematists would now insist on potential interbreeding between forms as the invariable criterion of conspecificity.

CHAPTER VII

SOME MATHEMATICAL CONSIDERATIONS

Relative Abundance of Species

THE species of butterflies in any habitat are not equally abundant, even under the conditions of uniformity which prevail in the equatorial regions, and it is the usual experience that a majority are comparatively rare while only a few are common. In most areas, usually well over 90 per cent. of the individuals collected belong to about 10 per cent. of the species. In Malaya, our observations indicate that at least 95 per cent. of the butterflies seen represent not more than 250 of the 900 odd recorded species.

The Fisher Series

It has been found that a mathematical relationship exists between the number of individuals and the number of species in a collection made at random in any area.

If S is the number of species represented in a sample comprising N individual specimens, we have the relationships :

$$S = \frac{-n_1 \log_e (1 - x)}{x} \dots\dots\dots (i)$$

and

$$N = \frac{n_1}{1 - x} \dots\dots\dots (ii)$$

where x is a number less than unity and a constant for the particular collection under examination, while n_1 is the number of species represented in the collection by a single individual. As S and N are known, a theoretical n_1 , and the unknown value of x , can be calculated from equations (i) and (ii).

The expression on the right-hand side of equation (i) can be expanded to give the logarithmic series first suggested in this context by Fisher :

$$S = n_1 \left(1 + \frac{x}{2} + \frac{x^2}{3} + \frac{x^3}{4} + \frac{x^4}{5} + \frac{x^5}{6} + \dots\dots \right)$$

This last expression is statistically important in that each separate component of the series respectively indicates the number of species represented by 1, 2, 3, 4, and so on, individuals in the total. As x approaches unity (as it does in large collections), the series tends to become a harmonic progression: S becomes the total number of species known from the area, and the separate components indicate the relative abundance of the different species there.

The Index of Diversity

Equations (i) and (ii) have been developed further along practical lines. The ratio $\frac{n_1}{x}$ ($= \alpha$) is independent of the size of the sample, and remains constant for the population under consideration, provided that the sampling is carried out under identical conditions. This constant is, therefore, a characteristic of the population, and is termed the *index of diversity*. The greater the value of α , the greater the number of species for the same number of individuals.

The equations can now be rewritten:

$$S = \alpha \log_e \left(1 + \frac{N}{\alpha} \right) \dots \dots \dots (iii)$$

and

$$\alpha = \frac{N(1 - x)}{x} \text{ or } x = \frac{N}{N + \alpha} \dots \dots \dots (iv)$$

The solution of equation (iii) to find α is long and tedious, even for mathematicians, but both Fisher and Williams have compiled tables to obviate this. One of the latter's, which serves our purpose here, is given below.

VALUES OF S FOR DIFFERENT COMBINATIONS OF N AND α									
$N \backslash \alpha$	50	100	200	500	1000	2000	5000	10,000	100,000
1	3.93	4.62	5.30	6.22	6.91	7.60	8.35	9.21	—
5	11.99	15.03	18.57	23.08	26.52	29.97	34.34	38.01	49.57
10	17.92	23.98	30.45	39.32	46.15	53.03	62.17	69.08	92.10
20	25.06	35.84	47.96	65.16	78.64	92.30	110.52	124.34	170.35
50	34.65	54.95	80.45	119.90	152.25	185.7	230.75	265.15	380.07
100	40.60	69.31	109.9	179.2	239.8	304.5	392.2	461.5	690.9
200	44.60	81.10	138.6	250.6	358.1	479.6	651.6	786.4	—

Table of values of S for different combinations of N and α .

The known value of S in the body of the table is found under the appropriate column for the known value of N , and the corresponding value for α is read from the left-hand side. The interpolation can best be made graphically. Now, from equation (iv), it is simple to find x , and then n_1 ($= \alpha x$) can quickly be deduced. This calculated, or "expected," value can now be compared with the actual known number of uniques in the collection, providing one measure of the extent to which the theoretical relationship between species and individuals obtains in the sample.

This Index of Diversity is an important characteristic of the population of the area. So α is of far greater significance than x , which is merely a property of the sample. It is the limiting value of n_1 —the

maximum number of species only represented once which can be expected in a sample, however large, from the given area. And, by increasing the size of a sample P times, the number of new species added will be $\alpha \log_e P$. For example, since $\log_e 2$ is 0.69, if a collection is doubled in size, it should include 0.69 α more species—or again by multiplying its size by 2.72 (= exponential e), the number of species should increase by α .

A comparison between calculated and observed values of n_1 in collections of butterflies from the Oriental Region is given in the following table.

STATISTICS OF COLLECTIONS OF BUTTERFLIES FROM THE ORIENTAL REGION

	Total individuals (N)	Total species (S)	α	x	n_1 (calculated)	n_1 (observed)
Malaya (Corbet)* ..	3,306	501	135.5	0.997	135.1	118
Pulau Tioman (Corbet) ..	157	41	18.0	0.887	16.0	19
Mentawi Islands (Corbet)†	1,878	135	33.4	0.983	32.8	37
Karakorum (Evans) ..	403	27	6.5	0.984	6.4	6
Sarawak (Moulton) ..	257	67	29.2	0.904	26.3	28
Malaya : Genus <i>Arhopala</i> (Corbet) ..	191	42	16.6	0.920	15.3	15
Mexico : Coleoptera, Elmidae (Hinton) ..	11,798	35	4.5	0.9996	4.5	4

* The Malayan figures include only those species of which not more than 24 individuals were collected.

† The Hesperiidæ are excluded as no record of their numbers was kept, and the collection was sunk by enemy action in September, 1940.

Williams's table has been used for all the calculations above, except those for the Malayan collection. In this, species of which more than 24 specimens were collected have been ignored because they were not systematically collected. So the more laborious methods of computation had to be employed. (The full figures for the collection were $N = 9031$ and $S = 620$ species).

The foregoing rather lengthy discussion has been introduced to show the lines along which recent research has developed, and to point to the vast fields open to statisticians and others interested.

(Basic Literature: Fisher, Corbet and Williams, 1943; Williams 1944, 1947; Corbet, 1946a.)

The Quantitative Study of Populations

Little is known concerning the density of the population of any Malaysian species of butterflies, and it would be of considerable interest to obtain some estimates of the numbers of individuals in a given area.

There is no reason for supposing that the difficulties in the way of making such measurements need be formidable.

The technique employed by Dowdeswell and Ford (Dowdeswell, Fisher and Ford, 1940), who estimated the population of the "Common Blue" butterfly (*Polyommatus icarus* (Rott.)) on one of the smaller of the Isles of Scilly, was to mark captured specimens, release them, and note the proportion of such marked specimens in the series of captures on following days. Each day about 50 specimens were caught at random and the marking was done with a spot of cellulose paint on the underside according to a scheme whereby the colour and position of the spot indicated the date of capture.

On the first day of the experiment, 40 specimens were caught, marked and released, and, on the following day, 43 individuals were caught, of which 5 had been marked on the previous day. From this it would be deduced that the total number of individuals of adult *P. icarus* on the island was

$$40 \times \frac{43}{5} = 344.$$

On account of the small numbers involved, however, this figure is not a very precise estimate of the total population, and the actual experiment was continued for a fortnight whereby a more accurate figure was obtained. One of the complications of such an experiment is that the population is in a state of flux, being augmented by emergences and decreased by deaths. For details regarding the method of calculation, the original paper should be consulted.

We suggest that it would not be difficult to estimate, say, the total population of adults of the feeble-flying Lycaenid *Zizina otis* in an isolated garden by catching the butterflies by hand ; or the number of individuals of *Amathusia phidippus* or *A. gunneryi* on a small coconut plantation by use of fruit bait.

In experiments of this nature, it is usually advisable to seek the advice of a statistician before drawing any far-reaching conclusions, and if such advice can be obtained before beginning the experiment, so much the better. In the past, many carefully conducted biological experiments have proved worthless on account of the absence of adequate controls.

Sex Ratio

It would be anticipated that the sexes of species of butterflies would occur in approximately equal numbers, and, although this may be the case in many species, it is certainly not the invariable rule. There can be no doubt regarding the great rarity of the female in such species as *Trogonoptera brookiana*, *Graphium sarpedon*, *G. delessertii*, *Appias nero* and *Hebomoia glaucippe*, while females predominate in collected series of *Troides aeacus*, *Parathyma nefte* and most species of *Arhopala*.

It has been suggested that this disparity in the sex ratio is more apparent than real, the explanation being that the seemingly rarer sex is equally abundant but less frequently collected on account of its different habits. This view, however, hardly accords with the facts in many cases, and the habits of the rarer sex of the species listed above are well known.

Corbet found that, of 100 *Catopsilia pyranthe* larvae collected at random in Malaya over a period of twelve months, only 40 were females, while a brood of larvae of *Euploea core* collected in Rangoon in 1932 produced six males and one female.

As far as our experience goes, it appears to be true that the scarce female of certain species of butterflies is less rare compared with the male on some of the smaller islands.

CHAPTER VIII

THE HISTORY OF BUTTERFLY COLLECTING IN THE MALAY PENINSULA

AS was the case in many other branches of biology elsewhere, the study of entomology in Malaya had its origins in the Linnaean school of naturalists, which flourished in the latter half of the XVIIIth Century, and owed its inspiration to the great Swedish biologist, Carolus Linnaeus. Although no Malayan butterflies were known to Linnaeus, and none was described in any of his publications, his pupil Olof Toreen spent two weeks at Kuala Kedah in May, 1751, when travelling from Surat to China, in the capacity of chaplain, on the Swedish East India Company's ship "Der Gothische Löwe" ("The Gothic Lion"). Although Toreen corresponded with Linnaeus during his travels, it appears that he sent him no butterflies from Malaya or China.

Another Linnaean disciple, Peter Osbeck, sailed from Sweden to Canton on the "Prinz Carl" in the same capacity as Toreen, but he travelled round the Cape and through the Sunda Straits. Although his ship stayed at western Java for a few days, Osbeck made no insect collections there, but devoted his time to plant collecting. During his stay at Whampoa, near Canton, however, from 25th August, 1751, to 4th January, 1752, he obtained a number of butterflies, all or some of which were purchased from a Chinese vendor. Many of these became the type specimens of the Linnaean names (published in the tenth edition of the *Systema Naturae* in 1758), of the commoner Oriental species of butterflies, and they are still extant in the Linnaean Collection in the possession of the Linnean Society of London. Many of Osbeck's specimens are figured in parts I and III of Clerck's beautiful *Icones Insectorum rariorum* and, in part II of the same work, are depicted the Amboinese specimens in the Museum of the Swedish Queen Ludovica Ulrica which are also the types of species described by Linnaeus in 1758. Osbeck's type specimens from Canton of *Papilio similis*, *P. plexippus*, *P. chrysippus* and *P. mineus* are figured on Plate 29, and it seems likely that the type specimens of *Papilio aglaja* and *P. hecabe*, also figured, were obtained by Osbeck. The Linnaean types of *Papilio philomela*, *P. phidippus* and *P. augias*, which were described in *Centurium Insectorum rariorum* in 1763, were collected in Java by H. J. Nordgreen. (Regarding Linnaean names of Oriental Rhopalocera, see Corbet, 1941*b*, 1941*c*, 1942*a*, 1945*a*.)

No Malayan species of butterflies were dealt with by Peter Cramer in his magnificent work *Uitlandsche Kapellen* (*Papillons exotiques*), Amsterdam, 1775-1790 (later portion and Supplement completed by C. Stoll),

although he figured many Javanese butterflies as well as a few from the west coast of Sumatra.

Sir Joseph Banks, who accompanied Captain James Cook on his first voyage in 1769-1771, when he visited Australia, New Zealand and Tahiti, appears to have collected a few butterflies in Java, and, on Cook's third and last voyage in 1776-1780, both William Bailey, also spelt Baily and Bayly (observer on H.M.S. "Discovery"), and David Nelson (botanist) collected butterflies on Pulau Condore, off the coast of French Indo-China, on Princes Island, off western Java, and in other places outside Malaysia. These specimens are preserved in the Banks Collection in the British Museum, and some of them were described by J. C. Fabricius in his systematic works on entomology (1775-1793). The Condore butterflies taken by Nelson in January, 1780, included the type of *Papilio lisias* (a form of *Marmessus ravindra*), as well as specimens of *Cirrochroa tyche*, *Zeltus amasa* and *Tagiades jabethus*. Nelson accompanied Lieutenant William Bligh on the ill-starred voyage of H.M.S. "Bounty," and, being one of the party set adrift by the mutineers, died of exposure at Coupang, Timor.

The Banks collection also contains butterflies taken by Dr. John Gerard Koenig, who was the first collector of butterflies in the Malay Peninsula. Koenig was born in Livonia in 1728, and studied under Linnaeus at Uppsala. He was primarily a botanist, and made a botanical expedition to Iceland in 1765. In 1768 he went to Tranquebar, south India, as Surgeon and Naturalist in the Danish Service, and, ten years later, became Naturalist to the Madras Establishment of the Hon. East India Company, an appointment which he held until his death at Jagrenathporam in 1785. During an expedition to Bangkok in 1778 and 1779, he paid scant attention to Lepidoptera, but, on his return from Bangkok, he travelled up the west coast of Malaya as far as Pulau Salang, in Peninsular Siam, visiting the Langkawi Islands *en route* in March, 1779.

Two months later, Koenig returned to Pulau Salang and remained there collecting plants and butterflies assiduously until July, when he became too ill to continue. He spent the remainder of the year in Malacca (then under Dutch occupation) and paid short visits to Kuala Selangor and Kuala Kedah on his way home to India at the close of the year. Koenig kept a detailed journal of his travels which is still preserved at the British Museum (Natural History). It is all but indecipherable, but an English translation of his first Siamese expedition appeared in 1894, *J. Straits Br. R. Asiat. Soc.*, 26 : 58-201 ; 27 : 57-133.

Koenig sent natural history specimens from southern India, Siam and Malaya to a number of European naturalists, and also to Sir Joseph Banks, to whom he bequeathed his plants, manuscripts and very detailed diaries. The butterflies from Pulau Salang and the Malay Peninsula in the Banks Collection, as well as those Koenig specimens which have

reached the Copenhagen Museum from the collections of Tønder-Lund and Sehestedt, were named and described by Fabricius in 1787 (*Mantissa Insectorum*, volume 2) and in 1793 (*Entomologia Systematica*, volume 3 (1)).

Unfortunately, as often as not Fabricius gave vague or incorrect localities for his insects, but it has been possible to identify the specimens obtained by Koenig, both in London and in Copenhagen, with a fair degree of certainty. The Fabrician types of *Papilio curius*, *P. arcesilaus*, *P. cocles*, *P. heliodore*, *P. martha*, *P. corytus*, *P. allica* and *P. iarbus* were taken by Koenig at Tamah, Pulau Salang, between May and July in 1779, and are in the Banks Collection in the British Museum. This collection also contains the type specimens of *Papilio empedocles* and *P. philomela* (both from Malaya), *P. erota* (Pulau Salang), and *P. periander* and *P. phocides* (Salang or Malaya), taken by the same collector.

The type specimens of *Papilio palinurus*, *P. cornelia*, *P. aspasia*, *P. claudius*, *P. panthera*, *P. pelea*, *P. monina* and *P. haraldus*, which were taken by Koenig in Malaya and were described from the Tønder-Lund Collection, are in the Copenhagen Museum, except that *P. cornelia* is missing. It seems probable that other types from the Tønder-Lund Collection with the same history are *P. democritus* (Pulau Salang), *P. coryta* and *P. atticus* (Malaya), and *P. strabo* (Salang or Malaya), but the last-named is now missing.

Other Fabrician types, which were almost certainly taken by Koenig in Pulau Salang or Malaya in 1779, and have reached the Copenhagen Museum from the Sehestedt Collection, are *P. diocletianus*, *P. haquinus* (now missing) and *P. freja*.

Regarding the Fabrician names of Oriental Rhopalocera, see Corbet, 1941f. Some of the butterflies obtained by Bailey, Nelson and Koenig are shown on Plate 30.

During his stay in Malaya between 1805 and 1824, THOMAS STAMFORD RAFFLES made extensive zoological and botanical collections, but they were lost at sea. The manner in which Raffles organised his Malay collectors has been described in Malay by his friend and contemporary Munshi Abdulla bin Abdul Kadar. The sixty species of butterflies collected by ADOLPHE DELESSERT during 1834, when he visited Penang, Malacca and Singapore, were recorded by Guérin-Ménéville (1839, 1840 and 1843) and a number were described as new. DR. THEODORE CANTOR, who was in the service of the East India Company, made a collection of insects in Penang and Malacca in 1840, and these passed to the Company's Museum. The thirty odd species of butterflies obtained were recorded by Horsfield and Moore (1857) but four of these are obviously not Malayan.

FRANCIS LOUIS DE LAPORTE, COMTE DE CASTELNAU, was in the French consular service, and held a number of important appointments abroad. He was one of the leading coleopterists of his time, and he collected butterflies while French consul-general at Singapore during

1860-1861. The thirty-one species of *Rhopalocera* (mostly *Lycaenidae*) from the Malay Peninsula described by C. and R. Felder (1860) were mostly, if not all, collected by Castelnau, and further Malayan species taken by Castelnau were described by the same authors in 1864-1867 (*Reise der oesterreichischen Fregatta Novara um die Erde. Rhopalocera*. Vienna).

DR. ALFRED RUSSEL WALLACE, the distinguished author of *The Malay Archipelago*, paid several visits to Singapore between 1854 and 1862, and he visited Malacca and ascended Mount Ophir, in Johore, in 1854 (Wallace, 1855). Of his collections of Malayan butterflies, Wallace studied only the *Papilionidae* (1865) and *Pieridae* (1867) in detail, although many of the *Lycaenidae* he collected were described by Hewitson (1862, 1863-1878), but often with erroneous localities. As many of Wallace's insects subsequently became type specimens, it would be a service to biological science if Bukit Timah and Mount Ophir were constituted nature reserves.

In a paper dealing with Asiatic butterflies, Butler (1867) described eleven new forms from Singapore, Malacca and Penang which had been taken by LIEUTENANT H. ROBERTS. Later, Butler (1877) published an account of a rather large collection of *Lepidoptera* taken a year or two previously by CAPTAIN STACKHOUSE PINWILL in Penang and Malacca. Many of the butterflies were described as new, and the same publication contained a complete catalogue of the 258 species of butterflies then known from the Malay Peninsula. A brief report of a small collection of butterflies taken in Malacca by DR. BEUTHIN was published by Cruger (1878), and the REVEREND L. C. BIGGS, Chaplain of Malacca and Penang, contributed a short article on "Butterflies in Malaya" in 1881. HERMANN KUNSTLER collected *Lepidoptera* for several European entomologists, including Dr. Honrath, in Singapore, Tanjong Malim, Taiping Hills, Gunong Bubu, and other localities in south Perak, and in Kedah, from 1881 to 1886. His most interesting discoveries were the female of *Elymnias kuenstleri* and *Amathusia schoenbergi* (Honrath, 1885, 1887a, 1887b). Some of the *Hesperiidae* obtained by Kunstler were described by Plötz (1885).

As a result of his visit to Penang and Province Wellesley in 1867, WILLIAM LUCAS DISTANT acquired a lasting interest in Malaya and Malayan natural history, and he inspired many residents in the Peninsula to study the local butterfly fauna. In the course of preparation of his classic work, *Rhopalocera Malayana* (1882-1886), with 482 pages and illustrated with 46 coloured plates and 129 text figures, he received material from LIEUTENANT A. M. GOODRICH, MAJOR J. M. KERR and CAPTAIN M. J. GODFREY (officers of the Inniskilling Fusiliers stationed at Singapore at this time), and from L. C. BIGGS, F. DURNFORD, J. K. BIRCH and W. EGERTON. Distant considered that he had enumerated 503 different species of *Rhopalocera* from Malaya, but his figures represent, in fact, under 450 species. Almost all the secondary growth species

were known to Distant, but he had very few of the butterflies confined to altitudes above 2,500 feet.

JOHANNES WATERSTRADT, a Dane, who ascended Mount Kinabalu, in Borneo, in 1885-1887, made several collecting expeditions to the Malay Peninsula between 1889 and 1904. He visited Gunong Tahan in 1900. Waterstradt obtained some important material, and much of it has reached the British Museum. The American traveller and naturalist, WILLIAM DOHERTY, made extensive collections of Lepidoptera in the Malay Archipelago, his most important expeditions (as far as butterflies was concerned), being to Engano and the Lesser Sunda Islands. The specimens and notes amassed during his two earlier visits to Perak were lost, but a selection of the butterflies collected in Perak in January-February, 1890, were described by Elwes (1891, 1892).

The celebrated Swiss entomologist, HANS FRUHSTORFER, collected butterflies in Indo-China, Ceylon and the Malay Archipelago from 1889 to the end of the century. He paid several short visits to the Peninsula, and collected in Penang and Perak. Fruhstorfer was the author of the greater part of volume 9 (which covered the Indo-Australian Region) of Seitz's *Macrolepidoptera of the World* (1908-1928), although Dr. K. Jordan was responsible for the Papilionidae and Dr. A. Seitz completed the Theclinae, Poritiinae and HesperIIDae after Fruhstorfer's death in 1922. For some time to come this book must remain the standard work on the butterflies of this Region, for all the forms known at the time of writing were described, and most of them are figured in colour. DR. ADALBERT SEITZ visited Singapore on several occasions towards the end of the last century, and has left a detailed account of one of his collecting days (Seitz, 1934).

The Oberthür Collection (now mostly in the British Museum) contained a large number of butterflies taken by LAKATT and PAMBOO in Penang and Perak in 1895. There are many very rare species of Lycaenidae and HesperIIDae represented in this collection, and it is evident that Lakatt and Pamboo were discriminating collectors. Nothing is known regarding them, although it is believed that they may have been Sakai.

In 1899, the SKEAT EXPEDITION (consisting of W. W. Skeat, J. J. Gwynn-Vaughan, N. Annandale and Richard Evans, and later joined by F. F. Laidlaw and R. H. Yapp), made anthropological, zoological and botanical collections in the southern Siamese Malay States, including Kelantan and Trengganu. Evans made an important collection of butterflies which is still preserved in the appropriate departments of the Universities of Oxford and Cambridge (Corbet, 1949a). The Lycaenidae taken by N. ANNANDALE and H. C. ROBINSON during an expedition to Perak and the Siamese Malay States in 1901 were reported on by H. H. Druce (1904).

The first quarter of the present century saw no extensive butterfly collecting in Malaya and few publications on the subject. During this

period, however, H. N. RIDLEY, Director of the Singapore Botanic Gardens, H. C. ROBINSON and C. BODEN KLOSS, of the Raffles Museum, and C. B. HOLMAN-HUNT and G. C. CORBETT, of the S.S. and F.M.S. Department of Agriculture, all made contributions towards the insect collections which were being amassed in the local museums.

In the last twenty years considerable progress has been made in the study of Malayan butterflies. The completion of volume 9 of Seitz has done much to foster an interest in the Rhopalocera of the Oriental Region, and during this same period remarkably complete collections of all orders of insects were made by the Selangor Museum. The present authors have collected extensively throughout the Peninsula, at all elevations, and in neighbouring countries.

H. M. PENDLEBURY ascended Gunong Tahan in December, 1921, making insect collections up to 7,100 feet; he visited Kedah Peak in March, 1924, and the Langkawi Islands during the following month; on several occasions he made large collections on Cameron Highlands and on Bukit Kutu. He visited Peninsular Siam in 1922, and Kina Balu, in Borneo, in 1929 for the purpose of making collections of insects (Pendlebury, 1923*a*, 1923*b*, 1927; Pendlebury and Chasen, 1932).

A. S. CORBET lived in Kuala Lumpur from 1927 to 1932, and made collecting expeditions to many parts of the Peninsula. The forest reserves within easy reach of Kuala Lumpur were worked systematically, and visits were paid to the Langkawi Islands (August and September, 1932), north Kedah (Padang Terap) (August, 1930), and to almost all the hill stations. North-eastern Sumatra was visited in May, 1930, and a little collecting was done at Rangoon and Kandy.

BRIGADIER W. H. EVANS made short visits to the Peninsula in 1930 and 1932. His *Catalogue of the Hesperidae of Europe, Asia and Australia* includes all the species found in Malaya, and his collection is now in the British Museum (Natural History).

Among those who have made useful collections of Malayan butterflies within the last twenty years or so may be mentioned DR. J. W. SCHARFF, MESSRS. H. GORDON GRAHAM, J. E. KEMPE, A. W. SLEEP, G. C. STUBBS and FATHER R. CARDON. DR. L. RICHMOND WHEELER collected butterflies in Malaya between 1934 and 1938, and published a list of the species taken by him on Penang (1942). Two outstanding collectors, MAJOR C. F. COWAN and MAJOR J. N. ELIOT, travelled the length of the Peninsula between 1936 and 1939, and obtained a high proportion of the known Malayan species, as well as many new to Malaya. These indefatigable collectors generously placed all their material at our disposal, and our knowledge of the Malayan fauna has been increased considerably in consequence. A. J. SLATTER made a collection of butterflies in north Kedah, in 1938 (Corbet, 1945*b*).

A number of European prisoners of war made collections of Lepidoptera in Malaya during the Japanese Occupation from 1942 to 1945.

Outstanding among these is F. C. VAN INGEN, who obtained 95 species of *Rhopalocera* in prison camps in Singapore, some of which were bred in Malaya for the first time.

The Langkawi Islands

A few butterfly collections have been made in the Langkawi Islands. CHARLES CURTIS, who was in charge of the Penang Botanic Gardens, visited the Islands on several occasions between 1888 and 1901, and the collections he made in April, 1896, and February 1899, are in the Hope Department of the University Museum at Oxford. H. N. RIDLEY, Director of the Singapore Botanic Gardens, obtained some Langkawi butterflies between 1897 and 1911, and H. C. ROBINSON and C. BODEN KLOSS, of the Malayan Museums, collected butterflies during their visit to the Islands in December, 1916, and January, 1917.

H. M. PENDLEBURY made extensive collections of insects on all the larger Langkawi Islands in April, 1924. A Malay resident on Pulau Langkawi, IDRUS BIN ABDULLAH, collected butterflies for A. S. Corbet in 1930-1931, and A. S. CORBET and H. GUNNERY visited the Islands in August and September, 1932. L. RICHMOND WHEELER made a short stay in August, 1937, and J. N. ELIOT collected on Pulau Langkawi in January, 1939. M. J. V. MILLER, manager of a rubber plantation on the Islands, made an important collection* of *Rhopalocera* from 1935 until the Japanese Occupation.

The East Coast Islands of Tioman and Aor

Entomologists have paid little attention to the east coast islands. Dr. J. G. KOENIG recorded on 12th February, 1779, "We passed the morning in exploring the island [Pulau Aor] from the ship." but there is no evidence that he collected any butterflies. Pulau Tioman was visited by H. C. ROBINSON and C. BODEN KLOSS in June and July, 1916, and a Malay schoolmaster on the island (name unknown) made a collection of butterflies for A. S. Corbet in 1931. V. KNIGHT collected on Pulau Aor in June, 1912. N. SMEDLEY visited both Pulau Tioman and Pulau Aor in April and May, 1927.

* This collection is now in the Raffles Museum, Singapore, together with wartime additions from prisoner of war camps in Malaysia.—12.XI.54.

CHAPTER IX

NOTES ON COLLECTING

BUTTERFLY collecting in the tropics is carried out much as in temperate regions, except that it is on a considerably larger scale, and the question of the preservation of specimens (mentioned elsewhere) assumes important dimensions.

NETS.—The first collecting requisite is a butterfly net. This cannot be purchased locally, and the average makeshifts are seldom durable. Even the nets sold by dealers for use in England cannot always be relied upon to stand the extra strain they have to undergo in the tropics without reinforcement, but anyone in doubt about the kind required should obtain a Kite or Balloon net from a dealer in entomological requisites. The advantage of this type is that it can be taken to pieces, and, when folded, occupies very little space. The net frame consists of a brass

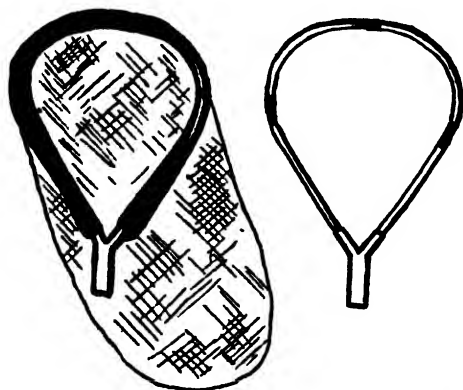


Fig. 11. Butterfly net. Showing complete net and frame.

“Y,” two rigid brass-socketed pieces of light wood forming a continuation of the arms of the “Y,” and two flexible pieces of cane which, when united, form a semicircle and fit into the sockets at the top end of the rigid pieces. The bag is made of green mosquito netting, with a 3-inch calico hem through which the frame is inserted.

The joint of the brass “Y” should be strengthened by being bound with thin wire and soldered. If a spare brass “Y” (with round nozzles) is ordered at the same time, a second net can be made quite simply according to the following directions.

After the joint of the "Y" has been strengthened, a length of rotan (about 5 feet 6 inches), with a diameter that slightly exceeds the nozzles of the brass "Y" (half an inch), is bent into a circle. The bending is carried out by smearing the rotan with engine oil, and pressing it into the required shape over a low flame. The ends of the rotan are then shaved slightly, and fitted into the nozzles of the "Y." Some trouble in the field may be saved by driving small screws through the ends of the "Y" to keep the rotan from working loose. The net frame should be about 1 foot 10 inches to 2 feet long, and 1 foot 3 inches at its widest point; it is a good plan to keep the frame-work, thus assembled, under pressure for a day or two, otherwise the cane tends to regain its original shape and becomes twisted.

Stout netting, such as is used for the good mosquito curtains, or nylon makes a very good bag, and, to save wear, it should have the aforesaid 3-inch calico hem to take the frame. The length of the bag should be such that the arm can reach to the end without difficulty (about 24-26 inches), and the end should be rounded off evenly. If desired, the material can be dyed green, brown, or black, as dead white is rather conspicuous, and seems to be noticed by certain butterflies. In this connection it may be worth suggesting that the collector's garments should be rather sombre also. One or two spare net bags should be kept in stock, especially if much collecting is carried out in thorny jungle. Net bags can be made cheaply by local tailors so long as a pattern is provided.

A stick for the net handle can be cut in any patch of forest, and it should be light but not whippy; otherwise the net will lag so much that a rapid stroke is impossible. The length of the stick is a matter of choice, bearing in mind that, within reasonable limits, the longer it is the wider will be the effective radius of the collector. It is a good plan to have available a long pole (say about 8 feet) to fit the net, to take any butterflies settled on tall shrubs or trees within range of the house or car.

COLLECTING.—Success in collecting demands a certain amount of luck, concentration, judgment, anticipation, and patience. Large slices of the first are often a beginner's perquisite; the other attributes (if not innate) may be developed with practice and perseverance! Catching butterflies in a country like Malaya is not by any means the simple matter it would appear to be, especially in forest or on steep hillsides where the range of vision or action at any given time is very restricted. Many butterflies are fast on the wing, and some have an erratic and deceptive flight, and turn very quickly to elude capture. Several species that live in tall forest are difficult to discern owing to the sharply contrasted light and shade effects; some species display themselves confidently in situations quite inaccessible to man, but may be dislodged and occasionally brought into the "danger zone" with a handful of earth; but rarities seem to delight in choosing that moment to fly near a collector when his attention is diverted by a common specimen! Nevertheless,

anyone able to devote a reasonable amount of spare time to the subject should acquire a collection of four hundred and fifty to five hundred species without great difficulty.

In catching butterflies it is essential to keep one's eye on the mark, and it should be found that an upward sweep of the net against rather than across or with the line of flight is most likely to be successful. A "blind swipe" is rarely productive, and a butterfly once missed—even a species that appears slow and heavy on the wing—can make an astonishingly rapid escape when alarmed. If a specimen is settled on the ground it should be approached cautiously, and the net placed quickly over it: never attempt a sweep stroke in this case. For a butterfly settled on a leaf, an upward stroke of the net is the most effective.

As soon as a butterfly has been caught, the frame of the net should be turned with a sharp twist of the wrist so that the net bag folds over and prevents the insect escaping.

Any area of primary forest where there has been little or no clearing should be found productive of butterflies, especially the well-wooded slopes and foothills of the main range. Catchment areas and forest reserves are excellent collecting grounds, but it is as well to ascertain beforehand whether permission to enter such places is necessary.

After a little experience, it will be found quite easy to recognise the majority of species in flight, and, with more practice, one may even acquire an almost unerring instinct for estimating which butterflies may be expected in whatever type of country one happens to be: the vegetation, altitude, site of the locality, weather conditions, and hour of the day, all play a part in the presence or absence of many insects.

Although some butterflies are on the wing throughout the day, most of them fly between 9 a.m. and 3 p.m., but certain species are in evidence only at fixed periods; for instance, some of the rarer "Skippers" belonging to the genera *Capila* and *Hasora* usually fly in the early hours of the morning about daybreak. The Nymphalids *Hestina* and *Prothoe*, on the other hand, are usually not seen until after midday. At dusk several of the Amathusiids are on the move, as well as some Satyrids (e.g., *Lethe*, *Melanitis*) and "Skippers" (especially some *Hasora*, *Pirdana* and *Bibasis*). The last fly so rapidly that they are difficult to detect, especially against a dark background; in fact, one may be aware of their presence only by the "click" when their wings turn in flight. Some crepuscular fliers may be found earlier in the day in places where there is deep shade, or even if the sky is overcast.

While collecting butterflies in the tropics, every endeavour should be made to secure specimens that are required when the opportunity occurs. This statement savours of the obvious, but it must be remembered that the incidence of certain butterflies is very fickle, and, although a particular species may appear to be plentiful in one place at one time, it may disappear completely a few hours later, and delay or failure to

make the most of the occasion often leads to disappointment. We have had reason to test this more than once, and it is remarkable how a missed species may not be encountered again for several years.

It is never advisable for a newcomer to the country to go far off the beaten track alone and unattended, as the uniformity of scene in the forest makes it easy to lose one's way and sense of direction ; furthermore, such contingencies as a bad fall or a sprained ankle must not be lost sight of, and the fact that no large mammals are seen is no proof of their non-existence. It is almost essential, therefore, to be accompanied on these occasions by someone who is dependable and accustomed to jungle travel.

FRUIT BAITING. Many of the rarer forest-dwelling species of Satyridae, Amathusiidae and Nymphalidae (*Euthalia* and *Charaxes* groups) may be attracted to overripe or rotting pineapples and bananas. Fruit in such mellowed condition may be had almost for the asking in most local markets, but it is as well to send the cook or "boy" to get it as, otherwise, a stall-holder may imagine that his displayed wares are under suspicion !

In the tropics, the process of ripening in the banana is very rapid, and this fruit is most attractive to insects a few hours before the skin begins to turn black ; it is this stage which corresponds with the maximum sugar content, the period of maximum attractiveness lasting only a few hours. Pineapples are attractive for longer periods, and are at their best when becoming soft.

If the best results are to be obtained, it is important to condition the fruit before use. It is essential that ripening should take place out-of-doors, with the fruit exposed to the sun for part of the day. Fruit left too long in the sun soon becomes too dry, and fruit which has been drenched in a heavy downpour is useless.

The best site for exposure of the bait is under a tree, from two to four feet from the ground, and, if possible, near a waterfall or river. The fruit may be suspended in large leaves or wire baskets, and a rag soaked in paraffin should be looped into the suspensory wire or string to protect it from ants. The best method of capturing any butterflies visiting the bait is by a quick upward stroke of the net which encloses the whole of the bait. Rarely are butterflies so engrossed in feeding that they can be captured by the forceps or fingers.

Occasional use of fruit bait is unlikely to repay the trouble expended, but continuous baiting for several weeks in the same locality may give very gratifying results. Many crepuscular species are attracted to rotting fruit, so it is advisable to inspect the bait before 8 in the morning and again from 5.30 onwards in the afternoon. Usually, few visitors frequent the bait in the afternoon.

Where continuous baiting is possible, a trap (constructed of mosquito netting and bamboo rods or stout wire) may be used in place of wire baskets. In such a trap (already described, Corbet, 1942a) the fruit was

placed on a metal tray suspended below the trap, and ingress to the trap was effected by a funnel-like aperture above the bait. When disturbed at the bait, the butterflies flew up the funnel into the trap and thence into an upper chamber of the trap, where they remained, as the only exit was by the small aperture in the floor through which they had entered. This upper storey had a door through which the captures were removed, and the whole trap was roofed over with a waterproof material. The trap was hung from the branch of a tree, with the usual paraffin rags on the hanging wire.

The butterflies most addicted to banana and pineapple bait in Malaya are *Erites* species, *Lethe* species, *Neorina lowii*, *Mycalesis* species, *Orsotriaena medus*, *Melanitis* species, and certain species of *Elymnias*, practically all the *Amathusiidae*, but especially species of *Amathusia* and *Zeuxidia*, *Kallima paralekta*, species of *Tanaecia* and *Euthalia*, *Herona sumatrana*, and species of *Prothoe* and *Charaxes*. A female of *Discophora timora* was taken coming to fruit bait as late as 9.30 p.m.

Other substances that attract certain butterflies are dung (especially that of elephant and tiger), wet wood ashes, damp salt, carrion, crushed giant snails, and seepages of water.

METHODS OF KILLING.—For the larger species, killing is accomplished readily and easily by gathering the net around the prisoner, folding the wings back so that they are closed, and then giving the thorax of the butterfly a light, but sharp, nip between the thumb and forefinger. A little practice is required to discover the amount of pressure necessary without damaging the insect; *Danaids* and *Papilionids* require more than others. Small butterflies (and moths) are best killed by being asphyxiated in a cyanide tube (see below), and, if the tube is in order, the insects become comatose very rapidly and death supervenes within a minute. Then they can be removed from the tube and placed neatly in paper envelopes (see below), using a pair of duck-billed forceps if handling is necessary. If opened, the wings should be closed before a specimen is put away.

It is usually worth while, after the day's collecting, to take a little extra trouble and gently extrude the male clasping organs of certain species of *Lycanidae* (especially *Celastrina*, *Nacaduba*, *Jamides* and *Arhopala*) and *Hesperiidae* (for instance, *Tagiades*, *Halpe*, *Potanthus*, *Telicota* and the *Pelopidas* group). This is carried out quite simply by squeezing gently, or inserting the point of a pin near the apex of the ventral surface of the abdomen and pushing out the genital armature until fully exposed. Needless to say, specimens must be still in fresh condition when this operation is performed.

PAPER ENVELOPES.—Specially made transparent envelopes are sold by dealers, but many collectors use triangular envelopes made from a plain, slightly absorbent paper or, if nothing better is available, newspaper sheets. Brown or glazed paper should be avoided.

Such envelopes are made easily by cutting out rectangular pieces of paper and folding them as directed below. The most useful dimensions for the unfolded pieces of paper are : 3 inches by 4 inches, for small specimens ; 4 inches by $5\frac{1}{2}$ inches, medium ; 5 inches by 7 inches, large. Other sizes can be cut as required.

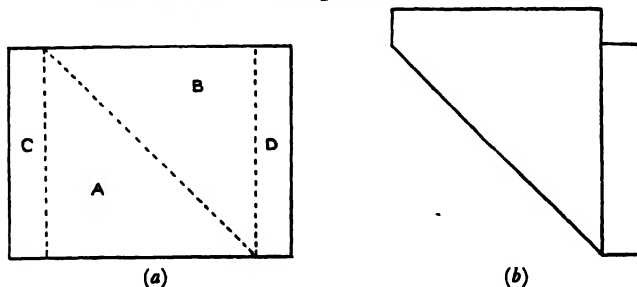


Fig. 12. Preparation of a triangular envelope.

The method of folding the envelope may be followed by referring to figure 12. Fold A to face B, then C is turned over on the outside of B, and D on the outside of A. The envelopes should be kept under pressure for twenty-four hours, otherwise they are liable to spring open. The advantage of using plain paper, in preference to news sheets, is that full data (locality, height above sea level, date, name of specimen when known, or any remarks or references to notes), can be written clearly on the outside of the cover. An alternative is to use cheap ready-made mailing envelopes, and, although these occupy rather more space than the "triangles" or "cocked hats," they are easy to handle and pack. The gummed flaps are removed and most of the envelopes cut in half : a half size being quite large enough for most Malayan butterflies. After inserting the insect, the edges of the two open sides are neatly folded back, and the data written on the front.

A supply of envelopes should be taken on all collecting outings, as they take very little space, and can be carried conveniently in a pocket. As the papers are filled, they should be transferred to a different pocket and, for preference, kept in a flat tin box. By using envelopes one is able to dispense with collecting boxes and cyanide jars. On return from the field, however, the papers containing insects should be deposited in a large cyanide jar for a short time to make certain that life is extinct. This is a necessary precaution in the case of the Danaids, which are very tenacious of life.

KILLING BOTTLES.—Any large, wide-mouthed, glass jar is suitable for a killing bottle, provided it has a tight fitting stopper. Some cheap and quite serviceable bottles are manufactured locally by Chinese. Killing bottles can be made up at any dispensary on signing the "Poison Book," but the following instructions may help those wishing to make or

remake their own killing jars. The ingredients are : cyanide of potassium crystals (98 per cent.), plaster of Paris, and a little water.

The cyanide crystals are placed at the bottom of the jar and just covered with a layer of dry plaster of Paris. A paste of plaster of Paris is then made by mixing with a little water and this is poured on top to a thickness of not more than half an inch. The plaster of Paris soon sets hard but the bottle should not be corked until a few hours later, so that surplus water is given time to evaporate. Several sheets of blotting paper cut to size should be placed on the plaster surface to absorb moisture, and the blotting paper should be changed as soon as it becomes saturated. Great care should be taken over the disposal of the used blotting paper, as it contains a deadly poison. Butterflies should never be put into a wet killing bottle, as they take up the moisture very readily after death and are thus ruined as specimens. If the stopper of the bottle is hollow on the inside, this empty space may be filled with the cyanide mixture, leaving the rest of the bottle as a lethal chamber.

KILLING TUBES.—These are useful for killing small butterflies, especially *Lycanids* and *Hesperiids*, which are not very amenable to the "thumb and forefinger" method, and, unless quickly disposed of, are liable to batter their wings rather badly in the net and lose some of their pristine beauty.

The best killing tubes are rather stout-walled, glass or plastic specimen tubes fitted with a cork or rubber bung.

Powdered cyanide crystals should be pressed down firmly to the bottom of the tube, and then a layer of *dry* plaster of Paris put on the top of this and pressed down also. Then three or four thicknesses of blotting paper, cut to size, should lie on the top of the plaster, with a small wad of cotton wool above them. A further three or four thicknesses of blotting paper should be pressed down on to the cotton wool. This will give an excellent killing tube, which will remain dry for a long time. Not more than one quarter of the tube should be occupied by the killing agent and packing.

It is unnecessary to add water to the plaster of Paris for these tubes, as the amount of moisture present in the cyanide crystals is sufficient to harden the plaster very gradually, and the packing will keep the top surface of the plaster in place until the hardening process is complete. We have found that adding water to the plaster reduces the effective life of such a killing tube by more than half, as the cyanide crystals readily take up the water and liquefy, and the resulting fluid oozes through into the upper part of the tube.

Specimens that have been killed with cyanide become rigid shortly after death, and remain in this condition for several hours, during which time the legs and antennae are rather brittle and liable to fracture. Therefore, as soon as they are dead, butterflies should be removed from the tube and placed in envelopes. When the *rigor mortis* has passed, however, specimens become supple again for about twelve hours.

CHAPTER X

PREPARATION AND PRESERVATION OF SPECIMENS

SETTING BOARDS. These should be of the flat type as illustrated (fig. 13). They are constructed of wood, lined with sheet cork, and papered. Setting boards can be made cheaply by local carpenters, if the necessary dimensions are given (see below) and the cork is supplied. There are several disadvantages (which need not be detailed here), in using the rounded setting boards, and, although every one is entitled to his own views on the subject, we recommend flat setting for Malayan butterflies after experience with both methods.

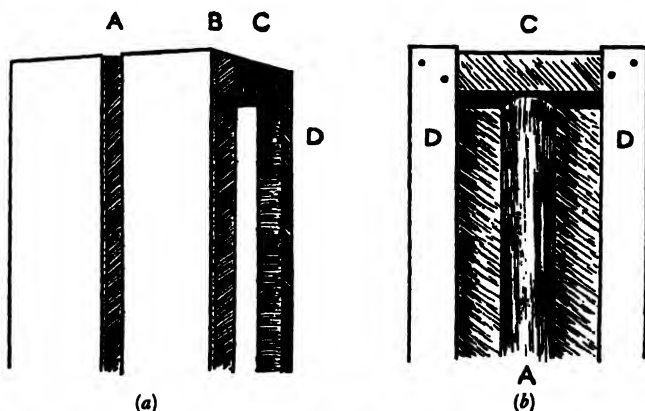


Fig. 13. Flat type of setting board.
(a) Seen from the side. (b) Seen from below.

Setting boards can be made as follows : two pieces of $\frac{1}{4}$ -inch boarding, of the required width (see below) and length, should be nailed to $\frac{1}{2}$ -inch blocks of wood, one at each end, allowing a gap of the necessary width for the groove. A strip of sago-pith, or a double thickness of sheet cork, is then fitted and glued to the underside so as completely to cover the space between the boards. This forms the groove. Strips of sheet cork, cut to the required width, are glued to the upper sides of the board, and, when the glue has set hard, the surface of the cork should be rubbed smooth with sand paper. Each wing of the setting board should be papered, and it will be found of great assistance if lines are ruled across the board with a T-square at $\frac{1}{4}$ - or $\frac{1}{2}$ -inch intervals.

One of the best local woods to be used as a base for the setting boards is *jelutong* (*Dyera* sp.), but setting boards for very small butterflies can be made from sago pith, grooved, smoothed and papered. They are cheap and very light.

Fourteen inches is a convenient length for setting boards, and the following widths may be found useful :

Suitable for species of	Width of each wing of setting board	Width of groove	Depth of groove
	mm.	mm.	mm.
Very small size	15	4	7
	20	7	7
Small size	25	7	7
	30	7	10
Medium size	35	10	10
	40	10	10
	45	12	10
Large size	50	12	10
	55	15	10
Very large size	80	15	15
	90	15	15

The greatest demand will be for boards with wings of 25 to 45 mm. width.

SETTING NEEDLES. A sewing needle, set in a wooden handle, is admirable for adjusting a butterfly's wings to the required level, and for holding the wings in place until they are strapped down with paper.

PINS. There are only two makes of pin at present on the market that have withstood all tests and can be recommended confidently for use in the Malayan climate. These are Stainless Steel pins of foreign manufacture and Nickel pins (D. F. Taylor & Co.) No. 16. These pins are $1\frac{1}{2}$ inches in length, and the Stainless Steel Nos. 1, 2 and 3 will be found most useful for smaller butterflies with a wing expanse of about $1\frac{1}{2}$ inches and less. Stainless Steel No. 5 and Nickel pins No. 16 are suitable for large specimens, but the size of the thorax will determine which pin should be used. Stainless Steel pins of a gauge smaller than No. 3 are liable to bend under slight pressure.

Silvered, gilt, or japanned pins do not last long under local atmospheric conditions, and all have been found to become brittle and collapse in the course of a few years. White silvered pins No. 2 (Kirby, Beard & Co.), however, are strongly recommended for use in indirect pinning or "staging," but this method does not enter into the scope of the present work.

Common brass pins, $\frac{1}{8}$ -inch size, will be found satisfactory for fastening down the paper strips over the wings of butterflies on the setting board.

PAPER STRIPS. There are several methods of setting butterflies, and, although the procedure varies, the principle is much the same. There is a preference for two continuous strips of paper down each wing of the board, the inner one narrow and the outer one broad. This is convenient when large numbers of butterflies are to be set, and is less laborious than cutting out rectangular pieces of paper to cover the wings of each specimen.

The latter method is recommended when only a few specimens are to be set at a time, and the paper used should be sufficiently tough to stand a slight strain without tearing away from the pins. For continuous strips, a thin linen paper similar to that used for tracings is excellent, and for individual pieces a paper similar to that used on the outside wrapping of cigarette tins is very serviceable, as it is strong, and has the added advantage of being semi-transparent.

FORCEPS. Two kinds of forceps are necessary: one pair with curved ends roughened on the inside, and one pair with smooth, straight, duck-billed points. The former, which are used for handling pinned insects, should be of the best quality, nickel plated, and with a peg. Unplated makes are apt to rust and lose their rigidity in our moist atmosphere, with the result that they "skip" the pins. The forceps with smooth duck-billed ends are almost indispensable when handling specimens before they are pinned.

HAND LENS. A hand lens with a magnification of 10 or 12 diameters will be found essential for studying structural details.

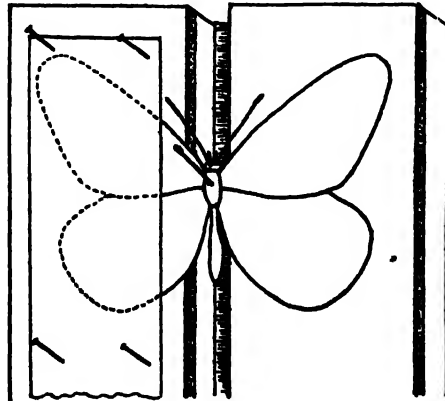


Fig. 14. Butterfly on setting board.

Setting

No attempt should be made to set a specimen unless the wings are in a pliable condition. If the wings are stiff, see the instructions under "Relaxing" given below (page 81).

A butterfly should be pinned through the centre of the thorax at a point equidistant between the bases of the forewings. The pin should not slope in any direction but should be absolutely perpendicular.

A setting board should be selected with regard to the spread of the wings and thickness of the body of the butterfly, and the pin should be inserted in the centre of the groove of the setting board so that, when viewed from any direction, it is perpendicular. The base of the butterfly's wings should be very slightly above the level of the board when the pin is driven home into the groove.

Next fix the inner narrow paper strips into position on the setting board by pinning them firmly at the top ends. Then hold the lower end of the left strip gently over the butterfly's left wing by the left forefinger and thumb, and, with the aid of the setting needle, adjust the wings to the required elevation on the board and ensure that they remain in this position by inserting a pin in the strip just below the hindwing. Repeat the procedure with the right wings. The height to which the forewing should be brought forward in front of the head is a matter of individual taste, but it has been our practice to arrange the insect so that the forewing dorsum is at right angles to the body.

When the wings have been spread satisfactorily, and the inner paper strips adjusted, the outer strips should be placed over the wings, and small pins inserted to keep the wings in position. If the head of each pin is directed outwards there is no chance of the paper slipping up the pin under a slight strain and so allowing the wing to sag. After the strips have been fastened, the antennae and abdomen should be arranged and cross-pinned if necessary.

There is a useful axiom that a freshly killed butterfly should remain on the setting board for twenty-four hours after the abdomen is stiff and hard. It is more difficult to estimate the correct time for specimens which have been in papers for some time and were relaxed before being set. A specimen that has been relaxed should remain on the setting board for at least a fortnight. Hesperids and heavy bodied Nymphalids are particularly liable to "spring" on removal from the boards, and this may, to some extent, be obviated by application of a small amount of spirit gum (shellac dissolved in alcohol) to the underside at the wing bases and strapping the specimen down to the board again for a further twenty-four hours. The tendency for set specimens to "spring" may be very marked under humid conditions, and the collections should be kept in as dry a situation as possible.

LABELS. A neat label, written in a durable brand of ink and indicating the place and date of capture, together with the approximate height above sea level (if the butterfly was found in the hills), and the collector's name, should accompany each specimen. This can be pinned alongside the butterfly while on the setting board, and should be affixed to the pin below the body of the insect before it is incorporated in the

collection. An accurately labelled collection is of much greater interest and value than an unlabelled one, as memory for details is apt to be deplorably short-lived in the tropics.

In cases where a large number of specimens require similar data labels, it might save trouble to type out on a sheet of paper the country, locality, and collector's name, as many times as possible. A space should be left above the collector's name for the subsequent addition of altitude, date, etc. This typed sheet can be photographed, and the lettering reduced to any size desired. Prints should be made on a mat surface paper so that other details can be filled in neatly with ink, and the labels can be cut out in the ordinary way. The counsel of perfection is to use printed data labels.

Instead of using data labels, some collectors give each specimen a number, and enter full details under a corresponding number in a special register. This method, though admirable in many ways, owes its weakness to the possibility of the records being lost, and at least one well known collection has been rendered almost valueless on this account.

NOTES. For anyone wishing to take more than a casual interest in the subject, it is suggested that a card index or notebook should be kept in which observations on species can be entered while still fresh in the mind: dates, localities, and conditions under which the specimens were captured might be recorded, together with any peculiarity of flight; whether any definite scent was emitted on capture (especially in the cases of the Danaids, etc.); method of courtship, if observed, life history and food plant of the caterpillar, if known; proportion of the sexes, or any other matter that is likely to be of interest and guidance at some future time.

RELAXING. Unless specimens are set soon after death, it will be found necessary to relax them before they are sufficiently soft to admit of manipulation without damage. The relaxing can be carried out by placing the pinned or papered specimens in a tin with a tightly-fitting cover. The relaxing medium in the tin is a piece of flannel wrung out in water, or damp blotting paper, damp cork, damp sand, or even a fairly large plug of damp cotton wool. Two or three drops of carbolic acid should be added to the water used for damping, as this helps to prevent any fungal growth. Specimens should be allowed to remain in the relaxing tin for twenty-four to forty-eight hours (according to the size of the insects and extent of rigidity of the wings), but care should be taken that they are not allowed to come in direct contact with the relaxing surface. Papered specimens can be laid on it while still in their envelopes, but pinned insects should be stuck in so that the wings and bodies cannot droop down and collect moisture.

TRANSMITTING SPECIMENS BY POST. In sending butterflies through the post it is generally advisable, in the case of set specimens, to relax

them and then place them in paper envelopes, with their labels, or with full data written on the envelope. By this method they travel with the minimum risk of damage, and take up very little space.

If set specimens must be sent by post, it is preferable to use special postal boxes, as supplied by dealers. The pins can be pushed home into the half-inch thickness of cork, and the bodies of the insects should be cross-pinned. After being wrapped in paper and fastened with a rubber band or string, the postal box should be packed into a large outer box with plenty of wood-wool or other soft material around it in such a way that it is buffered against external shock during transit.

Storing of Specimens

Whether butterflies are to be set or stored in papers must depend largely upon individual circumstances. If they are to be stored, they must be dried in their papers for about four hours in bright sunlight at the earliest opportunity, after which they can be packed in clean, dry, biscuit tins with close-fitting covers. As a preservative, three or four balls of naphthalene, roughly crushed, should be kept in each tin; this will need renewal about every six months. As a further precaution against the ravages of "mites," moulds, etc., it is a good plan to put blotting paper treated with the preservative mentioned on page 84 inside the lid and/or at the bottom of the tin.

It may be found necessary to dry the butterflies again after a lapse of two years or so, but, in any case, they should be examined at intervals, especially after a spell of wet weather. Papered specimens will keep almost indefinitely with proper care.

Of course, greater interest attaches to a collection in which the specimens are set, but a set collection is bulky, and the insects are more liable to suffer damage in transit; also the question of expense has to be considered, as good store boxes are not cheap and locally made articles, unless very carefully carpentered, may not be entirely satisfactory. If it is probable that one will be resident in Malaya for a considerable time, then a set collection should be the objective; but, if future movements are uncertain, there is much to be said in favour of a compromise and a pair of each at least of the commoner butterflies might be set and the rest kept in papers.

For those who can afford deal store boxes made specially for the purpose, the size recommended is $17\frac{1}{2}$ inches by 12 inches. These can be obtained from most dealers in entomological requisites in England. It should be stipulated that the boxes are bradded and lined with sheet or virgin cork and *not* cork carpet or cork composition, the reason being that the high humidity of the atmosphere in Malaya softens the glue in a composition, and, after a time, converts it into a spongy mass from which a pin cannot be withdrawn without an adhering lump of cork and glue. If, however, this should happen, as a result of the above

precautions being overlooked, the only possible course is to strip and reline the box with sheet cork and repaper it.

When relining store boxes or making setting boards, a certain amount of manipulation is necessary to fill up any gaps that occur in the cork surface. The best adhesive is French glue, and weights are necessary to keep the cork from curling at the edges. When the glue has set hard, the surface of the cork should be rubbed smooth with sand paper before it is covered with a good quality lining paper. We have found that a paste made from arrowroot flour is quite satisfactory for fastening down the lining paper. All boxes should be thoroughly well aired and treated with a preservative (see page 84) before being brought into use.

The sheet cork mentioned above is obtainable from dealers in England, and is sold in bundles of twelve sheets. Each piece measures about 11 inches long by $4\frac{1}{2}$ inches wide by $\frac{3}{8}$ inch thick, and the No. 2 quality is good enough for the purposes mentioned.

Where cheapness is the main consideration, it is necessary to rely upon locally made boxes. Some residents in Malaya use store boxes made from *meranti* (*Shorea* spp.), or with the top and bottom of three-ply wood. The bottom of the box is lined with a layer (5-6 mm. in depth) of a mixture of paraffin wax and powdered naphthalene, heated, and run in so that it has a smooth even surface when set. Pinned specimens are held quite firmly in this medium. The disadvantages of this method are the weight of the box and the careful attention necessary to ensure that the specimens are not attacked by injurious agents. Unless the wood of the boxes is carefully seasoned before use, a lack of air-tightness is liable to develop, and this gives access to "uninvited guests." Furthermore, specimens are apt to acquire mould, possibly due to moisture settling on the impervious wax surface.

Certain precautions are necessary : to ensure that the paraffin wax used is one of a sufficiently high melting point, so that it does not become plastic and creep up the pins in hot weather and thereby ruin the specimens ; conversely, that the wax does not set so hard that a pin cannot be inserted without cracking the surface ; also, that the flat method of setting (as recommended elsewhere) is adopted, otherwise the wings and bodies are liable to droop and come in contact with the waxy surface.

Pests in Collections

Many a good specimen that has fallen to a collector in the tropics has perished miserably through the action of mites, mould, ants or other injurious agents, although very little trouble is necessary to ensure immunity from pests.

Mites.—Some of the so-called "mites" are very small, rather inconspicuous, active insects belonging to the "Book Lice" order and of world-wide distribution. The presence of mites in a collection may be detected by a certain amount of dust forming below the specimens

attacked, and, in extreme cases, even the wings of butterflies may be severely damaged.

Use of the mixture mentioned below has been found an effective deterrent. When a box is infested badly, it is best to treat the specimens with benzene (see below) and remove them to a disinfected box, and subject the former to thorough treatment as directed.

Moulds are liable to develop on papered specimens which have not been dried thoroughly. The parts affected can be touched with a fine camel-hair brush dipped in Beechwood creosote, which destroys fungal growths, but very great care is necessary to avoid staining the wings.

Grease.—Greasy specimens should be immersed in benzene for twenty-four hours, and, on removal, should be left to dry in a current of air after excess liquid has been drained off.

Ants.—In houses where ants are a nuisance, it may be found essential to isolate tables, etc., on which boxes of specimens are kept by placing the table legs in rather shallow dishes of water. A few drops of paraffin should be added to the water to discourage mosquitoes from breeding therein.

Beetles.—The presence of beetles as pests in a collection of butterflies is a sign of prolonged neglect. The species liable to be found, which are all occasionally destructive in various stored products, are : *Anthrenus fasciatus* Herbst and *Attagenus gloriosae* F. (Dermestidae), and *Tribolium castaneum* Herbst (Tenebrionidae). Both larvae and adults feed upon certain kinds of dried matter.

Cockroaches, so often misnamed "black beetles," can play havoc with any specimens to which they gain access. Cockroaches are omnivorous, and active chiefly at night. When butterflies are being set, the boards should not be put away in a writing desk or book case, as cockroaches can squeeze through a very narrow opening, and they leave nothing but pins and some shreds of wings as evidence of their visitation. Setting boards should be kept in a special box provided with a close fitting lid. Ventilation is effected by cutting out a piece at either end of the box, and covering the apertures with fine wire gauze or perforated zinc.

Preservatives

A useful "general purposes" mixture that will deter all pests until its components evaporate completely consists of the following ingredients : powdered naphthalene (six parts), chloroform (one part), beechwood creosote (one part), petrol (four parts). These should be mixed gradually as follows : one and a half parts of naphthalene to one part of chloroform, then add one and a half parts of naphthalene and one part of beechwood creosote, and stir well. Then add the remaining three parts of naphthalene and the petrol to increase the bulk. Stir the mixture thoroughly both before and while it is being used. As this mixture is inflammable, due precautions must be observed, and it should be kept in an airtight bottle.

The mixture is painted, with a brush, on the inner surface of store boxes and other receptacles where specimens are to be kept. In the case of new store boxes, two applications at an interval of seventy-two hours should be made. It is advisable not to put set specimens into a freshly-treated box until forty-eight hours have elapsed.

This mixture leaves a fine deposit of powdered naphthalene adhering to the treated surfaces, and the general "atmosphere" created will keep all pests in check for a considerable time. Boxes, etc., that have been thoroughly disinfected need comparatively little subsequent attention so long as they are airtight. It is necessary to keep a careful watch over a collection during rainy periods, but an overhaul every six months or so should be sufficient. Camphor has been found a poor substitute for naphthalene in Malaya.

Paradichlorobenzene is a useful preservative, but it is more volatile than naphthalene and caution must be exercised in its use.

Formalin is unsatisfactory as a preservative as butterflies which have been stored in its presence may be difficult to relax; in any case, this chemical should *never* be employed where butterflies have brilliant blue colours produced by refracted light (e.g. *Zeuxidia*). Another substance that must be used with extreme care and avoided where possible is carbolic acid. Merthiolate is a useful liquid fungicide.*

Arranging the Collection

When arranging specimens in a cabinet or store box, it is as well to adhere to some recognised system. At the end of this book will be found the order of species in the various families; in general, this order follows closely upon that given in Seitz, *Macrolepidoptera of the World*, volume 9.

Take the largest specimen in each column as a guide to the lateral space required. The number of examples to be exhibited in each species is, of course, a matter of individual taste and circumstances, and it will save much subsequent rearrangement if spaces are left for additional specimens and species.

Where possible, at least one example in each species should be set upside down to display the underside of the wings.

The first, or generic name, may be placed at the top of the row before the series of species exhibited, and the specific name *after* the specimens to which the name refers. For instance :—

Genus TROGONOPTERA Hübner

Then specimens of

T. brookiana albescens Rothschild.

Then specimens of

T. brookiana trogon (Vollenhoff)

and so on.

The names can be written or typed on good quality paper, cut out,

* See Appendix, p. 493.

and fixed by means of fine "cabinet points," which are obtainable from dealers ($\frac{1}{4}$ to $\frac{1}{2}$ oz. should be sufficient).

Naphthalene balls can be fixed into a store box or cabinet quite easily by making the head of a pin red hot, and then thrusting this into a ball of naphthalene. The naphthalene melts sufficiently to allow the pin to enter, and then solidifies immediately and becomes firmly mounted.

Publications

Very few journals dealing with entomology are published in Malaya and the Netherlands East Indies. The *Malayan Nature Journal* which commenced publication in 1940, contains occasional articles on butterflies. The *Journal of the F.M.S. Museums* used to deal with systematic entomology in Malaysia, and, although primarily for the museum specialist, many of the articles on the butterfly fauna are of interest to collectors. Papers on butterflies occasionally appear in the *Bulletin of the Raffles Museum, Singapore*.

From the standpoint of the field entomologist, the most useful journal is that issued by the Netherlands Indies Entomological Society (*Entomologische Mededeelingen van Nederlandsch-Indie*)*; it appears quarterly, is attractively produced and contains good illustrations. There are papers in English and, usually, a summary in English is appended to the articles in Dutch. The subscription is moderate, and it can be obtained on application to the Secretary, Zoologisch Museum, Buitenzorg, Java.

* Now published (1954) under the name IDEA, as the Journal of the Entomological Society of Indonesia.

PART II

DISCUSSION OF THE SPECIES

INTRODUCTION

REFERENCE has been made on page 3 to the characters which separate butterflies from moths. Having decided that a Malayan insect is a butterfly, the next step is to determine the family to which it belongs : this can be done by the aid of the following key to the families of butterflies. Its subfamily (in the case of Pieridae, Lycaenidae and Hesperidae), or "group" of genera (Nymphalidae) is then found from the keys given under the appropriate families. Then the genus and, finally, the species is identified by the keys for genera and species respectively.

While every endeavour has been made to make the keys as concise as possible, we have not hesitated to add any additional information which might aid in identification. In fact, by keeping the diagnostic characters in the keys, as far as possible, we have avoided overloading the text with taxonomic details.

In the higher categories (families and genera), it is not always possible to make a separation on the basis of a single character ; frequently, two or more characters are involved and this adds to the complexity of the keys. The characters in the keys are listed in order of diagnostic importance but, as will be obvious on reading the alternative statement, characters other than the first are often supplementary and not always exclusive to the group or species.

Except where practical considerations preclude such a course, the phylogenetic arrangement in the Synonymic List in Part III has been followed in the keys.

Throughout this Part of the book, the keys are printed in smaller type. The more popular sections are printed in larger type. It is suggested that beginners and those collectors who do not wish to delve too deeply into the intricacies of the subject should consult first the plates on which the commoner species are illustrated and then turn their attention to the sections printed in larger type.

In the dichotomous keys, the reader is presented with a series of couplets of which one or other of two alternative numbered statements of characters has to be accepted as agreeing with those of the specimen under examination. The process of acceptance or rejection is continued until the statement selected leads to a name (generic or specific).

For instance, suppose a specimen of the male of *Eurema andersonii* is being identified by means of the key for the genus *Eurema* on page 135.

The butterfly in question has a single cell spot on the forewing beneath and so we pass from statement no. 1 to no. 2 and find that the specimen agrees in every particular with the three characters given in no. 2. There is no black border along the dorsum on the upperside of the forewing and so no. 3 and not no. 16 is accepted. In the choice between no. 4 and no. 7 we pass to no. 7 because the specimen is without a spot at the base of space 7 on the hindwing beneath. In the choice between no. 8 and no. 11, the latter is chosen on account of the single cell spot mentioned above. As the apical area on the underside of the forewing is not entirely dark brown, no. 13 is selected in preference to no. 12. Finally, the choice rests between no. 14 (*E. andersonii*) and no. 15 (*E. lacteola*) and the former is accepted because the black distal border on the forewing is more deeply excavated in space 2 than in space 3, the inner edge of the black border in spaces 1a and 1b is inclined towards the tornus rather than towards the base, and the wings above are deep yellow and not greenish yellow. Thus, the specimen under examination can only be *E. andersonii*.

It need hardly be added, perhaps, that it is essential to read both the alternatives of a couplet when there is the slightest ambiguity in meaning.

As the size of a butterfly is often an important aid to its identification, the length of the forewing (in millimetres) is given after the specific name in the keys to some of the more difficult genera.



Fig. 15. *Papilio memnon*. Fore-leg.

KEY FOR THE SEPARATION OF THE FAMILIES OF BUTTERFLIES

- 1 (18) Antennae approximate at the base. Forewing with two or more veins coincident or forked beyond the cell (fig. 1). Hind tibiae with only a terminal pair of spurs.
- 2 (17) Hindwing precostal vein present (but absent or rudimentary in the Pierid subfamily Coliadinae). Forewing with all veins present (except in genera of Pieridae other than *Valeria* and in the Amathusiid genus *Enispe*).
- 3 (6) Fore tarsi perfect in both sexes.
- 4 (5) Tarsal claws simple, that is, two on each tarsus (fig. 15) (except in *Graphium payeni* and *Lamproptera curius* in which each tarsal claw has a tooth on its inner edge). Fore tibia with a large medial spine. Forewing with four veins arising from the lower margin of the cell; vein 1a present and running to the dorsum, and a short basal transverse vein between vein 1b and the lower margin of the cell. Hindwing vein 1b absent (weakly present in *Troganoptera*, *Troides* and in some species of *Atrophaneura*). Forewing with all veins present (fig. 18). *Papilionidae*
- 5 Tarsal claws bifid, that is, four on each tarsus (fig. 25). Fore tibia without a spine. Forewing with three veins arising from the lower margin of the cell; vein 1a present and vein 1b not forked at the base. Hindwing veins 1a and 1b present. Forewing vein 8 absent (fig. 32) (except in *Valeria*, fig. 33). *Pieridae*
- 6 Fore tarsi imperfect and brush-like in one or both sexes.
- 7 (14) Fore tarsi imperfect in both sexes and without terminal claws (fig. 66) (except in ♀ of *Stibochiona*). Forewing vein 1b not bifurcate (except in *Danaidae*). Palpi not more than twice as long as the head. Hindwing cell closed or open.
- 8 (11) Hindwing cell closed by tubular veins.
- 9 (10) Forewing vein 1b bifurcate at the base, and no vein dilated at the wing base (fig. 1).

- 10 Forewing vein 1b not bifurcate, and, usually, one or more veins dilated at the wing base (fig. 45). *Satyridae*
- 11 Hindwing cell open between the origins of veins 4 and 5, or closed by non-tubular veins. *Amathusiidae*
- 12 (13) Forewing cell short and broad, and lower angle acute (fig. 53). *Nymphalidae*
- 13 Forewing cell not remarkably broad and lower angle not produced (fig. 62).
- 14 Fore tarsi imperfect and brush-like in ♂, perfect and with a terminal pair of claws in ♀. Forewing vein 1b bifurcate at the base. Cells of both wings closed by tubular veins.
- 15 (16) Palpi stout, conspicuously porrect and three or four times as long as the head (fig. 87). Forewing strongly falcate at vein 5. Hindwing vein 8 ending at the apex. *Libytheidae*
- 16 Palpi small, slender and porrect (fig. 90). Forewing not falcate. Hindwing vein 8 short and ending on the costa (fig. 89). *Riodinidae*
- 17 Hindwing precostal vein absent. Forewing vein 8 absent (except in *Deramas* and *Liphyra*, and in ♂ *Iraota*, *Amblypodia*, *Pralapa vidura*, sometimes in ♀ also, and *Jacoona* (3 species) (fig. 103)). Fore tarsi abbreviated in ♂ and usually with one or both claws absent; perfect and with both claws present in ♀ (fig. 122). *Lycaenidae*
- 18 Antennae widely separated at the base. Forewing and hindwing with all veins present and arising separately from the cell or the base of the wing (fig. 143). Hind tibiae usually with middle spurs. Fore tarsi with both claws present (fig. 139). *Hesperiidae*

FAMILY PAPILIONIDAE

Swallowtails

This family includes some of the most magnificent insects, and it is in the tropics that the species attain their maximum in size and beauty. Although usually known as Swallowtails, many of the tropical species are tailless.

The Papilionidae possess the following characters :—

Palpi small and appressed to the head. Fore-legs perfect in both sexes. Tarsal claws simple (i.e., only a single pair), but bifid in *Graphium payeni* and *Lamproptera curius*. Fore tibia with a large, leaf-like medial spine along the inner edge. Forewing with vein 1a present, short and terminating on the dorsal margin, vein 2 arising before the middle of the cell, and veins 7 and 8 stalked. Hindwing with a precostal vein, vein 1a present, and vein 1b absent (weakly present in *Trogonoptera*, *Troides* and in some species of *Atrophaneura*). Cell closed on both wings. In most species the hindwing has a conspicuous tail-like projection in the region of vein 4. Frequently the inner margin of the hindwing is folded over and within the fold, in the male, there may be a woolly pubescence, a series of scent brushes, or a patch of specialised scales (always absent in *Chilasa* and *Papilio*). By this means the sexes can be distinguished when the wing shape and pattern are similar.

The butterflies are of large size, and the wings are usually black and prominently marked with a bright colour. In general, the sexes are similar and, in a few species, the female is polymorphic.

The butterflies are strong on the wing and, as would be expected, the species are generally distributed throughout the Malay Peninsula, although three species are more or less confined to Kedawi. Many of them are very common, but a few are extremely rare. As a rule, they are more in evidence on the hills than at lower elevations. The

males of some species are gregarious and are found in large numbers congregated at moist spots on the ground. A peculiarity in the flight of many Papilionids is that the forewings flutter while the hindwings are kept fairly still ; this can be observed best while the insects are feeding.

The genus *Troides* comprises the heavy-bodied, tailless " Bird-wings," which are the most spectacular of the Malayan butterflies. The *Chilasa* species are all more or less faithful copies of species of Danaidae and are of particular interest in that two of the species, *C. paradoxa* and *C. clytia*, occur in two forms in both sexes. *Papilio polytes* and *P. memnon* are of considerable interest on account of the polymorphism

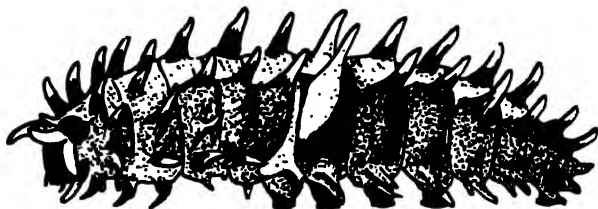


Fig. 16. *Troides amphrysus*. Larva.

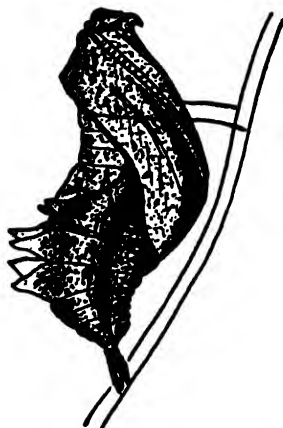


Fig. 17. *Troides amphrysus*. Pupa.

shown by the female. The genus *Graphium* shows much diversity in form but, in all of them the females are remarkably scarce. It is in the genus *Lamproptera* (" Dragontails ") that the greatest divergence from the normal form is seen ; they fly near water and might even be mistaken for dragon-flies by the uninitiated.

The larva is smooth (*Papilio* and *Lamproptera*) (fig. 5), or furnished with fleshy tubercles (*Troides* and *Atrophaneura*), spiny tubercles (*Chilasa*), or with a pair of short spines on the thoracic and anal segments (*Graphium*). In most species an osmeterium is present. The food plants comprise species of Aristolochiaceae, Anonaceae, Lauraceae and Rutaceae. The larvae live free ; some hide during the day, others are gregarious.

The pupa is upright, attached by a cremaster and supported by a silken girdle.

Key to the Genera of PAPILIONIDAE

- 1 (12) Antennae shorter than the forewing cell. Hindwing cell not much shorter than half the length of the wing and usually longer. Hindwing tail, when present, less than 25 mm. Forewing non-hyaline (except in *Graphium agates*, which has the apical area hyaline).
- 2 (11) Forewing vein 11 not anastomosed with vein 12. Tarsal claws not toothed on the inner edge.

- 3 (8) Collar red (pale yellowish white in *Atrophaneura priapus*). Abdomen red in some species. ♂ hindwing with a dorsal fold. Larvae on Aristolochiaceae.
- 4 (7) Forewing vein 11 arising opposite vein 2 (fig. 18). Wings large and ample. Frons black. Abdomen not red.
- 5 (6) Forewing cell much longer than the dorsum. Head and thorax conspicuously reddened above. Wings black with metallic green wedge-shaped markings. *Trogonoptera*
- 6 Forewing cell equal to or shorter than the dorsum. Head and thorax not conspicuously reddened above. Forewing black with greyish white streaks, and hindwing golden yellow. *Troides*
- 7 Forewing vein 11 arising opposite vein 3 (fig. 19). Smaller species. Frons red (pale yellowish white in *A. priapus* and black in *A. neptunus*). Abdomen red, particularly on the ventral side near the anal end (pale yellowish white in *A. priapus* and bright yellow in *A. neptunus*). *Atrophaneura*
- 8 Collar black. Abdomen not red. ♂ hindwing without a scent organ. Larvae not on Aristolochiaceae.
- 9 (10) Hindwing tailless. Abdomen below black, and spotted with white. *Chilasa*
- 10 Hindwing with a large spatulate tail at vein 4 (except in *P. demoleus* and some forms of *P. memnon*). Abdomen below not white spotted (except in *P. neptunus*). *Papilio*
- 11 Forewing vein 11 anastomosed with vein 12 (fig. 23) (except in *G. payeni*, which has the tarsal claws toothed on the inner edge). *Graphium*
- 12 Antennae much longer than the forewing cell. Hindwing cell much shorter than half the length of the wing. Hindwing folded from the base along the cell and produced to a tail (at least 25 mm.) at vein 4. Forewing with the outer half hyaline. *Lamproptera*

Genus *Trogonoptera* Rippon

Structurally very close to *Troides* but differs as stated in the key. A further distinction is that *Trogonoptera* has the cilia on the forewing termen uniformly greyish, not black and strongly whitened between the veins as in *Troides*. The habits of *T. brookiana* are different from those of the Malaysian species of *Troides*, for males of this latter genus are never found congregated at moist spots on the ground.

The male has a dorsal fold enclosing scent wool on the hindwing as in *Troides*.

The single species occurs in Neomalaya and Palawan, and the life history is entirely unknown.

Trogonoptera brookiana albescens Rothschild

Frontispiece and Plate 31, figure 1 ♂, 2 ♀

Raja Brooke's Birdwing

This large "Swallow-tail," with emerald green, feather-like markings on the velvety black forewings, and with a wing expanse of from 6 to 6½ inches, is one of the most striking butterflies of the Malay Peninsula. It was discovered in Borneo by Wallace in 1855 and, although he obtained males in some numbers, it was several years later before the first female was taken. The female has the green markings whitened towards the apex on the forewing, and a series of white submarginal spots on the hindwing: in flight, it presents quite a different appearance from that of the male.

Many observers have remarked on the rarity of the female of *T. brookiana*, and it has been estimated that one female is seen to about one thousand examples of the male sex. This estimate may be rather high; indeed, Wheeler (1940), who has made some detailed observations on the species, considers a ratio of one female to about twenty

males is more in accord with the true state of affairs. Nevertheless, the female must be very rare for Corbet saw only five or six individuals of this sex in five years, during which period several thousand males were seen.

The male is not uncommon along the banks of forest streams at low to moderate elevations. Sometimes dozens may be found settled in the vicinity of hot springs, or on paths or river banks moistened by urine. The female prefers higher ground, occurring from about 750 to 3500 feet; she is found flying around flowering trees, and flies higher than the male, being seen from 20 to 40 feet above the ground and often higher. The female is later on the wing than the male, and Wheeler records seeing two females feeding on a flowering *Bauhinia* tree between 5 and 6 p.m. During flight, the white markings on the forewing of the female are very conspicuous and give the impression of being in rapid motion. Wheeler states "In certain conditions these moving white wing tips show up almost like white lights in the jungle shade."

Two or three observers have reported numbers of females, together with males, on forest roads during the earlier hours of the morning.

The life history of this remarkable butterfly is still unknown, although it is almost certain that the food plant is a climbing species of Aristolochiaceae.

T. brookiana albescens is rather local in Malaya, being confined to the central states of Perak, Pahang and Selangor; it is absent from the Malayan islands. The species occurs in distinct subspecies in Sumatra, Borneo, the Natuna Islands and Palawan, that in the last-named island differing so markedly from the other races that some authors prefer to regard it as a separate species.

About 1938 the Sumatran subspecies *trogon* (Vollenhoven) was discovered in swampy forest land in Johore by Eliot and Cowan. In this form the female is not very dissimilar from the male, and appears to outnumber this latter sex; indeed, of

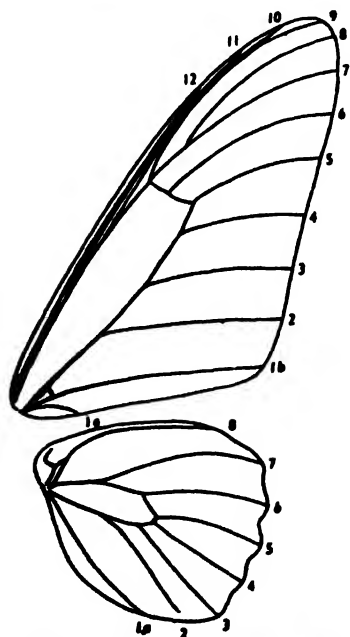


Fig. 18. *Trogonoptera brookiana* ♂.
Venation.

the first five examples taken four were females. The males are reported as very quick on the wing, and most easily caught in the afternoon between 4 and 6 p.m., when they visit the flowers of a *Mussaenda* shrub. No congregations of males such as occur in subspecies *albescens* have been observed.

Genus *Troides* Hübner

Birdwings

Also known by Boisdual's later name *Ornithoptera*, which is now reserved for the members of the *priamus* group, which are essentially Papuan in distribution.

Hindwing termen smooth, never dentate or caudate. Male clasping organs well developed. Male with a dorsal fold along the inner margin of the hindwing above, this fold enclosing scent wool and fringed with long hairs.

The larvae are large, and bear large spiny tubercles; they feed on species of Aristolochiaceae. The pupae have the head truncate, and the wing cases strongly projecting; they are supported by a silken girdle looped round the waist as usual in the Papilionidae and Pieridae.

Distributed from Ceylon and India, through Malaysia and the Archipelago, to New Guinea, Australia and the Pacific Islands.

(Basic literature: Zeuner, 1943a).

Key for the separation of the species of *Troides*

- 1 (4) Upperside forewing distal area of cell not paler (rarely so in *T. helena*). + upperside hindwing black submarginal spots not conjoined.
- 2 (3) Upperside hindwing black marginal spots in spaces 2 and 3 not black dusted on the inner edge. *T. helena*
- 3 Upperside hindwing black marginal spots in spaces 2 and 3 black dusted on the inner edge. *T. anacrus*
- 4 Upperside forewing distal area of cell and apical area beyond paler, with pale yellow vein stripes in ♂ and white vein stripes in ♀. ♀ upperside hindwing black submarginal spots conjoined.
- 5 (6) Upperside forewing with pale yellow or whitened vein stripes uninterrupted from the cell-end to the apex. Upperside hindwing golden yellow. *T. amphrysus*
- 6 Upperside forewing with pale yellow or whitened vein stripes tending to become obsolete beyond the cell-end and before the apex. Upperside hindwing golden yellow with a greenish tinge. *T. cuneifera*

Troides helena cerberus (C. & R. Felder)

Plate 31, figure 4♂, 5♀

The Common Birdwing

The wing expanse of this species equals and often exceeds that of *Trogonoptera brookiana*. The forewing is black but, in the female, the vein stripes are whitish beyond the cell; the hindwing is a rich golden yellow, with black veins, and a black marginal border which extends from the apex to the tornus. The female has a series of large, black, submarginal spots on the hindwing, and the sexes can be distinguished at a glance. The female is more variable than the male.

T. helena occurs not uncommonly throughout the Malay Peninsula at all usual elevations. It frequents forest clearings, and is seen occasionally near villages and even in town gardens. Unlike the preceding species, the males are not found at moist spots on forest roads, but both sexes may be taken flying near flowering trees in the forest. The female is more abundant than the male.

The butterfly has been bred in Malaya on a few occasions, although there appears to be no description of the life history ; the food plant is a climbing species of *Aristolochia*. The species is widely distributed, ranging from north India to Hainan and Hong Kong, and through the Malay Archipelago to New Guinea.

Three further, but rarer, species of the *T. helena* group are found in Malaya : they are restricted to primary forest, and *T. aeacus* does not ascend the hills. Where it occurs, *T. aeacus thomsonii* (Bates) is not uncommon, but the rather diminutive male is much rarer than the female. This species is easily separated from *T. helena* in that the black marginal spots in spaces 2 and 3 (and usually in space 4 also) are black dusted on the inner edge, and it differs from all the other species of the *T. helena* group in the extensive carmine colouring on the underside of the thorax. The full grown larva of this species has been found feeding on *Apama corymbosa* in Kanching Forest Reserve, Selangor. It is crimson-brown with six rows of fleshy spines, each tipped with pale red, and with a prominent white "saddle" mark (length 35 mm.). *T. aeacus* is distributed from north India to west China and Malaya.

The two remaining species of the group differ from those described in that the distal area of the cell and the apical region of the forewing above are pale yellow or white, and the black submarginal spots on the hindwing in the female are larger and conjoined. In *T. amphrysus ruficollis* (Butler), which generally frequents lowland and foothill forest, the pale vein stripes on the upperside of the forewing are well defined between the cell and the apex of the wing, while in *T. cuneifera peninsulae* (Pendlebury), which is rarer and occurs at higher elevations, these vein stripes tend to become obsolete towards the apex of the wing. *T. cuneifera* (Genitalia, Plate 2, fig. 1) further differs from *T. amphrysus* (Genitalia, Plate 2, fig. 2) in having the hindwing strongly tinged with green in the male, somewhat less so in the female, and the hindwing veins more broadly blackened in both sexes. Both species are entirely Malaysian but *T. cuneifera* has not been found in Borneo (Gabriel, 1941). For the larva and pupa of *T. amphrysus*, see figures 16 and 17.

Genus *Atrophaneura* Reakirt

This genus has been known by various other names, including *Polydorus* Swainson, *Byasa* Moore and *Tros* Kirby.

Structurally, the genus is closely allied to *Troides* ; indeed, the two are often grouped together as the "Aristolochia Papilios," but the *Atrophaneura* species are smaller and have shorter wings. Many of the butterflies serve as models in mimetic associations.

In the tailless species, the male has, on the hindwing above, a broad dorsal fold containing scent wool and fringed with long hair. In the tailed species the male has a weakly developed fold with specialised scales

but without wool. In the female, the inner margin of the hindwing is folded over but no specialised area is enclosed.

The larvae have large spiny tubercles, and are quite similar to those in the preceding genus; they also feed on Aristolochiaceae.

Distributed from Ceylon and India to China and Japan, and through the Archipelago to New Guinea, Australia and the Solomon Islands.

Key for the separation of the species of *ATROPHANEURA*

- | | | |
|----|--|-------------------------|
| 1 | (6) Hindwing not tailed. | |
| 2 | (3) Upperside hindwing with large black submarginal spots. | <i>A. priapus</i> |
| 3 | Upperside hindwing without submarginal spots. | |
| 4 | (5) Upperside forewing no whitish suffusion near the tornus. | <i>A. nox</i> |
| 5 | Upperside forewing with a whitish suffusion near the tornus (may be very faint in individual males). | <i>A. varuna</i> |
| 6 | Hindwing with a spatulate tail at vein 4. | |
| 7 | (8) Upperside hindwing without white spots and with a carmine subternal patch. | <i>A. neptunus</i> |
| 8 | Upperside hindwing with white spots. | |
| 9 | (10) Upperside hindwing with white stripes in the cell. | <i>A. coon</i> |
| 10 | Upperside hindwing cell without white markings, except occasionally at the extreme tip. | <i>A. aristolochiae</i> |

Atrophaneura nox erebus (Wallace)

Plate 32, figure 7 ♀

The Malayan Batwing

In this species the female is taken more frequently than the male. The butterfly is rather local, and is found in well-wooded localities on the plains.

The female has a wing expanse of some 120 mm., and is black or bluish black, and the veins in the distal half of the forewing are margined with white. The male is smaller (wing expanse between 85 and 98 mm.), the wings are bluish black, and the veins are not margined with white. In both sexes the body is black, but the underside of the head and thorax is adorned with carmine tufts.

The larva is similar to that of *T. aeacus*, and is stated to feed on a species of Piperaceae. The species is confined entirely to Malaysia.

The closely allied *A. varuna varuna* (White) is rather similar in appearance, but is rarer and usually taken at higher elevations. Wheeler (1940) found the males at *Lantana* flowers in the Botanic Gardens, Penang, and at the foot of Kedah Peak during the hours of strong sunlight, the females more abundant after 5 p.m. In *A. varuna* both sexes are bluish black with a more or less distinct pale bluish patch in the ternal area of the forewing, and the hindwing is more elongate than in *A. nox*. The butterfly recalls the male of *P. memnon* somewhat, but lacks the red patches at the wing bases on the underside and the collar is carmine. The species is distributed from Sikkim to Indo-China and Malaya.

A. priapus egertoni (Distant) is larger than the other local members of *Atrophaneura*. The creamy buff head and thorax have earned for it

the Malay name of *kapala puteh* in Sumatra. The wings are black above, and the distal half of the hindwing is pale greyish blue with two series of rather large interneural black spots; on the upperside of the hindwing the male has a white tornal area enclosed by the abdominal fold and outwardly margined with red. The insect is rather rare and confined to primary forest on the hills and foothills. The species occurs from south Burma, through Malaya, to Sumatra (subs. *sykorax* (Grose Smith)) and Java. In this butterfly, as well as in the closely allied *A. hageni* (Rogenhofer), it is not unusual to find female specimens with the male aedeagus affixed in the genital opening.

***Atrophaneura coon doubledayi* (Wallace)**

Plate 32, figure 8 ♂

The Common Clubtail

In this elegant butterfly the black forewing is shaded with greyish white in the distal half, and the hindwing is white, with broad black vein stripes and a broad black distal margin bearing a series of diffuse white spots; the last few abdominal segments are pale pink. The female resembles the male but the forewing is broader and more rounded.

The larva feeds on *Apama tomentosa*.

A. coon occurs throughout the Peninsula and is confined to the plains. In Kedawi it is commonly found flying round *Lantana* blossoms in the neighbourhood of villages but, in Malaya proper, it is essentially a forest insect. The species is distributed from Assam and Burma to Sumatra and Java; it is absent from Borneo.

An allied species is *A. neptunus neptunus* (Guérin-Ménéville): in this beautiful butterfly the black forewing is generously dusted with white, the hindwing is entirely black except for a bright carmine subtornal patch, and the distal half of the abdomen is bright yellow. The species is not common and frequents rather open woods on the plains; it occurs from south Burma to Neomalaya.

***Atrophaneura aristolochiae asteris* (Rothschild)**

Plate 32, figure 9 ♂; genitalia, Plate 2, figure 3

The Common Rose

This butterfly bears a general resemblance to *A. coon*, but it has a more robust appearance, and the hindwing is broader and the tail less spatulate. The wings are black, with the distal half of the forewing shaded with greyish, and the hindwing has a white post-discal patch and a series of red submarginal spots which become fainter towards the apex of the wing. The sexes are similar, except for the rounder wing contours in the female, and the butterfly shows little variation except in size.

The larva is black with red tubercles and feeds on *Aristolochia*. The insect is found in well wooded localities throughout the Peninsula, including Kedawi and Tioman Island, and it appears to be commoner in the centre and south than in the north. It is rather local and often found in small colonies.

The ♀-form *polytes* of *Papilio polytes* bears a superficial resemblance to *A. aristolochiae*, and is believed to be a mimic of this butterfly. In this case the mimic is much more abundant than its model, but the explanation may be that the wild food plants of *P. polytes* are scarce, for this species is distinctly rare in the forest. The recent cultivation of *Citrus* in and near towns and villages must have resulted in a large increase in the population of *P. polytes* and from a rare forest species it has become an abundant urban insect. Wallace thought that the tailed female form of *P. memnon* was a mimic of *A. coon* and, if this is so, the fact that the *Citrus*-feeding *P. memnon* is now much more abundant than *A. coon* can be explained in the same way.

A. aristolochiae ranges from Ceylon and India to south China, and through Malaysia to the Philippines and Lesser Sunda Islands.

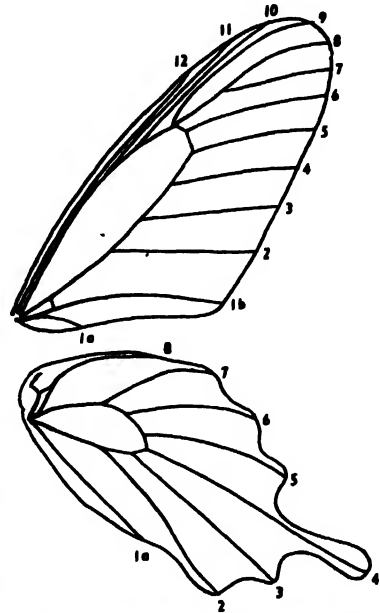


Fig. 19. *Atrophaneura aristolochiae* ♂. Venation.

Genus *Chilasa* Moore

This and the following genus constitute the Fluted Papilios.

Chilasa is a genus of rather doubtful status, but we maintain it here as it differs from *Papilio* in the much longer wings, in the tailless hindwing and in the abdominal series of white dots. All the butterflies are mimetic and resemble species of *Danaus* and *Euploea*. The male is without secondary sexual characters.

At first, the larvae resemble a bird's dropping, but later they have numerous spiny tubercles and are gaudily marked. They feed on species of Lauraceae. The remarkable pupae are stick-like and truncate, and the head has horns.

The genus is represented from Ceylon and India to China, and through the Archipelago to New Guinea, Australia and the Solomon Islands.

Key for the separation of the species of *CHILASA*

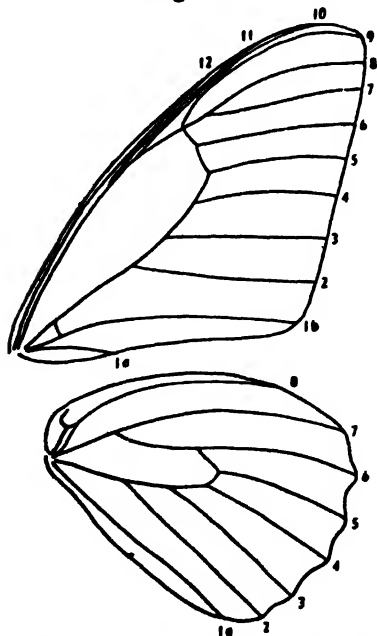
- | | | | |
|---|-----|---|----------------------|
| 1 | (6) | Hindwing origin of vein 7 nearer the origin of vein 6 than of vein 8. | |
| 2 | (3) | Upperside forewing greyish blue with blackened veins, and upperside hindwing broadly bordered with reddish brown. | <i>C. agestor</i> |
| 3 | | Upperside dark brown or black with the forewing almost unmarked. | |
| 4 | (5) | Hindwing with a yellow oval tornal spot. | <i>C. slateri</i> |
| 5 | | Hindwing without a yellow tornal spot. | <i>C. mahadeva</i> * |
| 6 | | Hindwing origin of vein 7 nearer the origin of vein 8 than of vein 6 (fig. 20). | |
| 7 | (8) | Underside hindwing with yellow marginal spots. | <i>C. clytia</i> |
| 8 | | Underside hindwing without yellow marginal spots. | <i>C. paradoxa</i> |

Chilasa clytia clytia (L.)

Plate 32, figures 10 ♀, and 11 ♂; genitalia, Plate 2, figure 4

The Common Mime

This butterfly is dimorphic in both sexes, form *onpape* Moore resembling a brown *Euploea* species with a white subapical patch on the forewing as in *E. crameri* and *E. core*, while form *dissimilis* (L.) is a good mimic of a bluish grey species of *Danaus* such as *D. hamata*. Both forms can always be recognised by the deep yellow marginal spots on the underside of the hindwing.

Fig. 20. *Chilasa clytia* ♂. Venation.

The species occurs from Ceylon and India to south China, Malaya, the Philippines and the Lesser Sunda Islands, but in the Peninsula it is confined to Kedawi and Singapore Island. On Singapore Island only form *dissimilis* has been found, and it seems probable that the species is a comparatively recent introduction.

The butterflies frequent flowering shrubs in secondary growth and, in their slow and deliberate flight, resemble the Danaid species which they are believed to mimic.

The larva has been bred in Singapore during the Japanese occupation by van Ingen. The young larva is brown and cream, and resembles a bird's dropping; later it is velvety black or dark green, with carmine spiny tubercles and spots, and with large creamy white patches. It feeds on species of Lauraceae (*Cinnamomum*, etc.). The remarkable

pupa resembles a dead piece of stick broken off at the top, and projects at an angle of about 40° with the resting surface.

* As the larva of the nearly related *Papilio dravidorum* W.M. is of the *P. holonus* type, it may be that *C. mahadeva* is more correctly placed in the genus *Papilio*.

A recent discovery at high elevations on Cameron Highlands is *C. agestor agestor* (G. R. Gray), which resembles *Danaus sita*. The wings are bluish grey, with heavily blackened veins, and the distal half of the hindwing is reddish brown. It is very rare in Malaya, and is otherwise confined to the mountain ranges from India to China and Indo-China.

***Chilasa paradoxa aenigma* (Wallace)**

Plate 32, figure 12♂

The Great Blue Mime

C. paradoxa occurs in two forms in both sexes, form *aegialus* (Distant) resembling the respective sexes of *Euploea diocletianus*, while the male and female of form *aenigma* (Wallace) are less striking copies of the corresponding sexes of *Euploea mulciber*.

C. paradoxa is never common, but is encountered from time to time in rather open forest at all elevations. Usually, several individuals are taken together, which is somewhat surprising, for although the butterflies normally adopt a slow fluttering flight, they are rapid and lofty on the wing when alarmed.

Like most mimetic species, the butterflies are variable and several varieties of the two principal forms have been named.

The species was first described and figured by Zincken-Sommer in his *Beiträge zur Insectenfauna von Java* in 1831. It is distributed from north India to Malaysia.

Two other species of *Chilasa* remain to be mentioned. *C. slateri perses* (de Nicéville) is dark brown above, with a submarginal series of short whitish transverse streaks on the hindwing, and suggests *Euploea eyndhovii*. It can be readily recognised by the small yellow tornal spot on the upperside of the hindwing. It is local on the forested hills and rarely occurs below 2,000 feet. The flight is distinctive in that the butterfly flies steadily at a more or less constant height of about 10 feet from the ground. It is distributed from north India to Neomalaya.

C. mahadeva selangoranus (Fruhstorfer) is black (browner in the female), with a faint white spot at the cell end on the forewing. The hindwing has a submarginal row of creamy white lunules, and, in the male, an inner series of lunulate spots of the same colour (increasing in size towards the apex). The Malayan race was first described from two specimens taken in the "Mountains of Selangor." Waterstradt obtained a series from Gunong Tahan in 1910, but the butterfly was not found again in Malaya until Miller discovered it in the Langkawi Islands in 1938 and A. J. Slatter found it in north Kedah in the same year. The species is restricted to south Burma, Siam and Malaya. It belongs to a group of species which are relatively recent arrivals in Malaya from the north and, although found on the plains in Kedawi, they are restricted to the mountains in Malaya proper.

Genus *Papilio* L.

Thorax or abdomen not red below. Hindwing with the inner margin curved downwards and forming a groove beneath in both sexes, the male being without a scent organ. Sexes similar, except in *P. memnon* and *P. polytes*, some female forms of which resemble *Aristolochia* *Papilios*, but, as in the previous genus, the males can be distinguished by the prominent valvae.

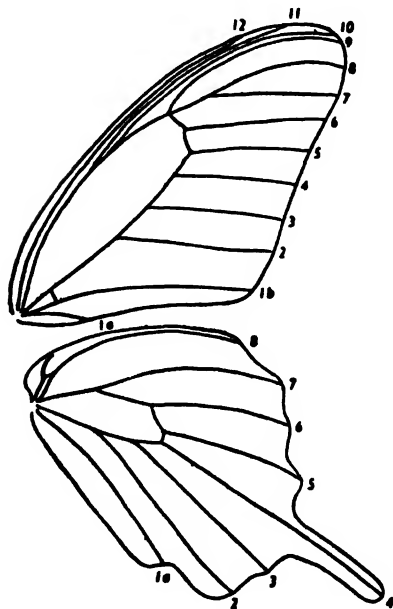


Fig. 21. *Papilio helenus* ♀. Venation.

Larvae comparatively smooth, being spiny only in the early stages when they resemble bird droppings; later, they are green and usually with oblique bands. They feed on *Citrus* and other species of Rutaceae. The pupae have two cephalic horns.

The genus is represented in all the continents.

Key for the separation of the species of
PAPILIO

- 1 (18) Upperside hindwing without a bright metallic green discal patch.
- 2 (17) Underside wing bases not red.
- 3 (4) Hindwing tailless. Upperside black with yellow markings. *P. demoleus*
- 4 Hindwing tailed at vein 4. Upperside without yellow markings.
- 5 (6) Upperside black with a pale yellowish green macular band from the apex of the forewing to the mid-dorsum of hindwing. *P. demolus*
- 6 Upperside without a pale green band.
- 7 (8) Upperside forewing with a white macular subapical band (may be faint or obsolete in Kedawi individuals). Underside hindwing without red or reddish spots. *P. nephelus*
- 8 Upperside forewing without a white macular band. Underside hindwing with red or reddish submarginal spots.
- 9 (12) Hindwing without a white spot in space 4.
- 10 (11) Underside hindwing with a complete series of red submarginal lunules. *P. helenus*
- 11 Underside hindwing with no red submarginal lunules above vein 3. *P. isuaroides*
- 12 Hindwing with a white spot in space 4.
- 13 (14) Underside hindwing with no reddish submarginal lunules above vein 3. *P. isuara*
- 14 Underside hindwing with reddish submarginal lunules in spaces 5, 6 and 7 (*P. fuscus*) and in spaces 1b to 7 (*P. polytes*).
- 15 (16) Upperside hindwing without a well defined white spot in space 3. *P. fuscus*
- 16 Upperside hindwing with a well defined white spot in space 3. *P. polytes*
- 17 Underside wing bases bright red. *P. memnon*
- 18 Upperside hindwing with a bright metallic green discal patch.
- 19 (20) Upperside forewing with a bright metallic green discal band. *P. palimorus*
- 20 Upperside forewing without a green band. *P. paris*

Papilio demoleus malayanus* WallacePlate 32, figure 13 ♂; genitalia, Plate 2, figure 5***The Lime Butterfly**

On the upperside the wings are black with large yellow markings; these form an irregular macular fascia running from the apex of the forewing to the mid-dorsum on the hindwing, and there is a series of

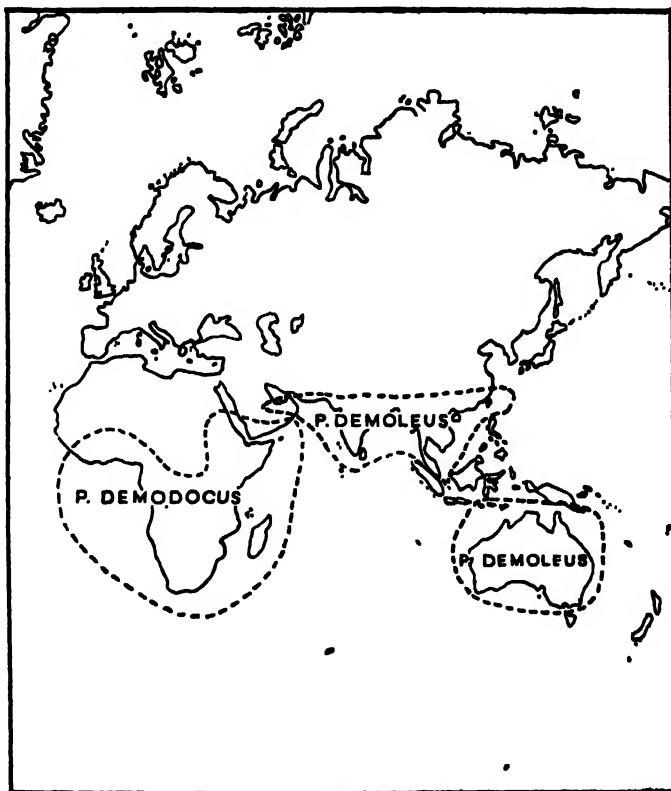


Fig. 22. Distribution of the oriental *Papilio demoleus* and the Aethiopian *Papilio demodocus*.

The two species are very similar in appearance and habits, but the male genitalia are different. The hiatus in the distribution of *P. demoleus* in the Malay Archipelago is curious, especially as the larva feeds on *Citrus*.

yellow submarginal spots on both wings. In space 1b on the hindwing is a red spot with an anterior narrow blue lunule; in the female this blue lunule forms the anterior portion of a large black circular spot above the red spot. The underside is predominantly yellow with a series of reddish post-discal bars on the hindwing.

Eggs are laid singly in *Citrus* leaves and the young larva is dark brown with white markings and closely resembles a bird's dropping. Later, the larva becomes green, with a few dark brown markings, and relies for protection from the sharp eyes of its enemies upon close harmonisation with the leaves of the food plant. It is during this latter stage that the larva suffers the heavier mortality. The greenish brown pupa is attached to a stem of the food plant or to a nearby object by a silken girdle; the imago emerges about 8 o'clock in the morning.

The butterfly is common in gardens and wherever *Citrus* is grown in the Malay Peninsula. It is confined to the plains and, although common in Ceylon, India and Indo-China, and found in the Lesser Sunda Islands, New Guinea and Australia, it does not occur in the Large Sunda Islands, Philippines, Celebes or Moluccas. The species occurs as far west as north-east Arabia, but in south-west Arabia and the Æthiopian Region it is replaced by the closely allied *P. demodocus* Esper, which has different male genitalia and is usually treated as a distinct species.

***Papilio demolition demolition* Cramer**

Plate 32, figure 14 ♂

The Banded Swallowtail

The wings are black with a pale greenish macular band extending from the apex of the forewing to the mid-dorsum of the hindwing. The hindwing has a series of pale greenish lunulate submarginal spots and a black ocellus ringed with orange-red at the tornal angle. There is a long spatulate tail at vein 4. The sexes are alike (except that the lunule in space 2 on the hindwing is reddened in the female), and the species is surprisingly constant in markings.

The larva feeds on *Citrus*. The butterfly is swift in flight and, although it occurs in well wooded localities at all elevations, it is commoner on the plains in Malaya; it may be captured most easily when feeding on *Ixora* flowers. It occurs also on Tioman Island.

The species is distributed from Burma to Malaysia and Lombok.

***Papilio nepheles sumatus* Corbet**

Plate 32, figure 15 ♂

The Black and White Helen

A large black butterfly with a prominent white macular subapical band on the forewing and a large white discal patch on the hindwing. There is a large spatulate tail at vein 4 on the hindwing. Some variation occurs in the size of the butterfly and in the width of the forewing band. In the Kedawi subspecies *raya* Corbet, the forewing band is much reduced and may even be obsolete. In the female, the forewing subapical spots are rather diffuse and slightly black dusted,

and, on the hindwing above, there is at least a trace of a black dusted diffuse white spot in space 1b.

The larva is said to feed on *Citrus* but it is probable that it has alternative food plants.*

The butterfly frequents forest paths, and is more abundant on the plains than the hills. It has a swift, restless flight, and almost always has to be taken on the wing.

The species is distributed from north India to Burma, China and Malaysia. The northern races, with the forewing band obsolete, were formerly regarded as a separate species, *P. chaon* Westwood, but the discovery of the intermediate Kedawi race has removed all doubts regarding their conspecificity.

***Papilio helenus helenus* L.**

Plate 32, figure 16 ♂; genitalia, Plate 2, figure 6

The Red Helen

The forewing is black above and, on both surfaces, the hindwing has a white discal patch consisting of three large white spots in spaces 5, 6 and 7, and a series of red submarginal spots which are usually obsolete on the upperside in the male. The hindwing has a spatulate tail at vein 4.

The life history of *P. helenus* is similar to that of *P. demoleus* and *P. polytes*, and the larva feeds on *Zanthoxylum* and *Citrus*. Usually, *P. helenus* is the most abundant Papilionid on the hills, and it may be taken at rest on the banks of forest streams. It is generally distributed throughout the Peninsula, including Kedawi and Pulau Tioman, but it is rather uncommon on the plains.

Distributed from Ceylon and India to south Japan and China, and through Malaysia to the Philippines and Timor.

The very rare *P. iswaroides curtisi* Jordan, which is confined to the hills in the Main Range, differs from *P. helenus* in that the red submarginal lunules on the underside of the hindwing are obsolete above vein 3. The species is known only from Malaya and Sumatra (Genitalia, Plate 2, fig. 7).

P. iswara iswara White is also similar to *P. helenus* but larger, the white patch on the upperside of the hindwing extends from vein 4 to the apex, and, on the hindwing beneath, there are blue post-discal lunules distal to the white spots in spaces 2, 3 and 4. The female has a large black ocellus ringed with red in each of the spaces 1a and 2 on the hindwing above.

P. iswara prefers rather open forest country in the neighbourhood of streams, and is more in evidence on the hills than on the plains. It has been found on the Langkawi Islands and it is distributed from south Burma to Neomalaya and Celebes.

A more widely distributed species is *P. fuscus*, which ranges from the Andaman Islands and Neomalaya to Celebes, the Moluccas, New Guinea, north Australia and the Solomon Islands; it is absent from Java,

* See Appendix, p. 493.

the Lesser Sunda Islands and the Philippines. *P. fuscus prexaspes* C. & R. Felder is the smallest species in the group, and the white patch on the hindwing is arranged in a distinctive manner; there are no red marginal lunules on the hindwing above. The butterfly is rare in forest country on the plains in Malaya proper.

***Papilio polytes romulus* Cramer**

Plate 33, figure 17 ♂

The Common Mormon

On the upper side the male is black with a series of rather large pale yellow oval or subrectangular spots running across the hindwing from apex to mid-dorsum; a few small spots on the distal margin of the forewing form a continuation of the hindwing central band. On the underside, the hindwing has a series of red submarginal lunules. The female is polymorphic, occurring in two forms in Malaya and throughout most of its range, but it is trimorphic in Ceylon. The female forms in Malaya are (a) form *cyrus* F., which resembles the male but has a rather faint red tornal spot in space 1a on the upperside of the hindwing, and (b) form *romulus* L., which is a passable mimic of *Atrophaneura aristolochiae*, but can always be distinguished by its entirely black abdomen. The third form is a mimic of *Atrophaneura hector* L. and is almost confined to Ceylon. In the more northerly parts of China, beyond the range of *A. aristolochiae*, only ♀-f. *cyrus* occurs.

For remarks upon the relationship between these female forms, based on Fryer's classical breeding experiments in Ceylon, see pages 44-46.

The life history of *P. polytes* is similar to that of *P. demoleus*, and the larvae are almost indistinguishable. Now that *P. polytes* has become urbanised the usual food plant is *Citrus*, but, in the forest, it is known to feed on other species of Rutaceae (*Murraya*, *Triphasia*, *Glycosmis* and *Zanthoxylum*).

The butterfly is common in the neighbourhood of gardens and villages where *Citrus* is grown, but it is uncommon in forest land. It is found throughout the Malay Peninsula, including Kedawi and Tioman Island, but is strictly confined to the plains. Both sexes visit flowers, and the male is swifter in flight than the female.

The species is distributed from Ceylon and India to China, and through the Archipelago to the Moluccas and the Lesser Sunda Islands.

***Papilio memnon agenor* L.**

Plate 31, figure 3 ♂, 6 ♀

The Great Mormon

This is one of our most interesting butterflies and, in addition to its large size and striking appearance, it is remarkable for the polymorphism of the female.

The male upperside is black, dusted with blue ; on the underside, the hindwing has a red tornal patch and both wing bases are red. In the Malay Peninsula the female is trimorphic. Of the two tailless forms, the commoner is ♀-f. *esperi* Butler, which is similar to the male but has a large white subapical area on the forewing; in ♀-f. *butlerianus* Rothschild the white area is situated in the dorsal region of the forewing. When in flight, these tailless forms bear a certain resemblance to the females of *Trogonoptera brookiana*, *Atrophaneura nox* and *A. varuna*. The third form, ♀-f. *distantianus* Rothschild, is quite different and is somewhat like an enlarged copy of *Atrophaneura coon*, but the wing bases are red beneath and the body is yellowish buff.*

Of the 21 females of *P. memnon* collected in Malaya by Corbet, 10 were tailed (♀-f. *distantianus*) and 11 were tailless (9 ♀-f. *esperi* and 2 ♀-f. *butlerianus*). For some years it was thought that ♀-f. *distantianus* alone occurred in the Langkawi Islands, where *Atrophaneura coon* is not uncommon and *Trogonoptera brookiana* and *Atrophaneura nox* are unknown, though *A. varuna* occurs. Recently, however, a few examples of a tailless form have been obtained in these islands. The tailed form has not yet been found in Singapore, where the common ♀-form is *esperi*.

The green larva has whitish markings (figs. 5 and 6) and feeds on *Citrus* ; the life history is similar to that of *P. demoleus* and *P. polytes*. The larva is not found in gardens as commonly as the allied species, and it seems probable that *P. memnon* breeds more frequently in the forest. According to our experience, larvae obtained on *Citrus* in gardens are usually heavily parasitised.

P. memnon is fairly common throughout the Peninsula up to about 4,500 feet ; it occurs in Kedawi as well as on Pulau Tioman. The female appears to prefer higher altitudes than the male, and is most frequently taken in primary forest while the male is ubiquitous. Males may be found congregated at moist spots on the banks of forest streams and the females are often seen visiting flowers.

The species is distributed from Ceylon and India to south China and Malaysia. Typical *P. memnon memnon* L. occurs in Java and Borneo, and the Sumatran race is *anceus* Cramer. In these countries the female forms mostly differ from those found in Malaya. Jacobson (1909) carried out some breeding experiments with this species in Java, and found the polymorphism of the female to be of the same nature as that of *P. polytes*.

***Papilio palinurus palinurus* Fabricius**

Plate 33, figure 18 ♂

The Banded Peacock

In this beautiful butterfly the wings are black, green dusted, and with a rather broad metallic green band running from the mid-costa on the forewing to the mid-dorsum on the hindwing. The underside

* See Appendix, p. 493.

is brown with red submarginal lunules on the hindwing. The hindwing is crenulate, and there is a long spatulate tail at vein 4.

The butterfly is swift and dashing in flight, and difficult to capture. It is not uncommon in the forests of Kedawi, but becomes progressively rarer proceeding southwards. Wallace obtained a specimen during his visit to Malacca in 1854 (Wallace, 1855), but Corbet saw it on no more than half a dozen occasions during five years' collecting in Selangor and the neighbouring states. The Fabrician type specimen was one of the butterflies collected by Koenig in Pulau Salang or Kedah in 1779.

The life history is unknown. Distributed in Neomalaya, Palawan and the Philippines.

Genus *Graphium* Scopoli

Kite Swallowtails

In most species the wings are thinly scaled and semi-transparent. In species of the *antiphates* group and in *G. payeni* and *G. empedovana*, the hindwing has a long tail at vein 4. The inner margin of the hindwing is bent upwards, and the edge is fringed with long hairs; the male has a patch of scent wool or a pecten of long hairs within the scent fold, which is weakly developed in *G. payeni* and *G. empedovana*.

The larvae have the thorax swollen, there is a pair of short spines on each of the three thoracic segments, and the anal segment is produced to two short points. Species of Anonaceae and Lauraceae usually serve as food plants.

The pupae are narrow, the abdomen has two dorsal carinac, and the head has two horns.

The genus is circumtropical in distribution.

Key for the separation of the species of GRAPHIUM

- 1 (10) Hindwing with a well developed tail (at least 10 mm.) at or near vein 4.
- 2 (7) Hindwing tail very long (at least 14 mm.), and gradually pointed. (*Antiphates* group)
- 3 (4) Upperside hindwing with a red subternal spot. *G. agestis*
- 4 Upperside hindwing without a red subternal spot.
- 5 (6) Upperside forewing with the black bars in the cell not extending below the cell.
- 6 Upperside forewing with the two basal black bars in the cell extending to the dorsum. *G. antiphates*
G. aristus
- 7 Hindwing tail spatulate and less than 14 mm.
- 8 (9) Upperside fulvous brown with dark brown bordering. *G. payeni*
- 9 Upperside greyish brown with pale green post-discal spots in spaces 2-6 on the forewing. *G. empedovana*
- 10 Hindwing tail absent or short and blunt.
- 11 (24) Underside hindwing with red discal spots. (*Sarpedon* group)
- 12 (13) Upperside forewing without submarginal spots. *G. sarpedon*
- 13 Upperside forewing with green submarginal spots.
- 14 (23) Upperside forewing with a single series of cell spots. Hindwing crenulate and not tailed at vein 4.
- 15 (16) Underside hindwing with a dark costal bar (which is red centred), on the silvery median fascia, and separated from all other dark markings. *G. dason*
- 16 Underside hindwing dark costal bar not separated from all other dark areas.
- 17 (20) Underside hindwing dark costal bar united with the dark basal band.
- 18 (19) Underside hindwing dark costal bar red spotted. *G. euryptilus*
- 19 Underside hindwing dark costal bar not red spotted. *G. soemon*

- 20 Underside hindwing dark costal bar produced to form a narrow, dark, central band joining the post-discal dark area.
- 21 (22) Underside hindwing dark central band not red spotted. *G. bathycles*
- 22 Underside hindwing dark central band red spotted at the costa. *G. arycles*
- 23 Upperside forewing with a double series of cell spots. Hindwing tailed at vein 4. *G. agamemnon*
- 24 Underside hindwing without red spots. (*Macareus* group)
- 25 (26) Hindwing with a bright yellow subternal patch (indicated rather faintly only on the underside in the ♀). *G. delessertii*
- 26 Hindwing without a yellow patch.
- 27 (28) Upperside forewing without clearly defined bars across the cell; there may be some diffuse greyish spots. *G. macareus*
- 28 Upperside forewing with clearly defined pale greenish grey bars across the cell
- 29 (30) Abdomen beneath with a black medial line. Upperside hindwing with a single row of elongate post-discal streaks internal to the submarginal lunules. Forewing longer than 35 mm. *G. macareus*
- 30 Abdomen beneath without a black medial line. Upperside hindwing with two rows of post-discal spots internal to the submarginal-lunules. Upperside darker than *G. macareus*. Forewing less than 35 mm. *G. megarus*

Graphium antiphates itamputi (Butler)

Plate 33, figure 19 ♂

The Fivebar Swordtail

G. antiphates was known to Linnaeus for a specimen (probably obtained by Osbeck) is figured in Clerck's *Icones Insectorum rariorum*, supplementary plate x, fig. 2, together with other Chinese butterflies. It was some years later, however, before the species was described and named by Cramer, who likewise had a Chinese specimen before him.

The Swordtails are remarkable for the very long, slender and tapering tail at vein 4 on the hindwing. They are forest butterflies, swift on the wing, and apt to be mistaken for Pierids. The males may be taken congregated at moist spots, but the females are always rare.

G. antiphates is creamy white above, with a series of black transverse stripes in the costal area of the forewing and in which the basal and distal interspaces are filled in with green. On the underside, the basal half of the hindwing is green, with black stripes and spots, and the distal half is ochreous.

The larva is olive-green, speckled with white, with dorsal and subdorsal lines, and with two yellow transverse lines on the thorax. The food plant is *Anona lawii*, a climbing shrub (Anonaceae).

Males of *G. antiphates*, as well as males of other species of Papilionidae and Pieridae, are attracted by dead males of this species on the roadside. In Malaya, the butterfly is found in the forested lowlands. The species is distributed from Ceylon and India to south China, Malaysia and the Lesser Sunda Islands.

G. agetes iponus (Fruhstorfer) is rather similar, but the forewing has a whitish hyaline apical area outwardly bordered by the black distal margin and inwardly defined by a black stripe running from the costa to the distal end of vein 2; the hindwing has red spotting at the tornus on both surfaces and red discal spots on the underside. *G. agetes* is

rarer than *G. antiphates*, and prefers higher elevations. It is distributed from north India to Indo-China and Neomalaya.

G. aristeus hermocrates (C. & R. Felder) is practically confined to Kedawi and Perak as far as Malaya is concerned. The butterfly is smaller than *G. antiphates* or *G. aetes* and, on the upperside of the forewing, it is more heavily marked with black transverse stripes; on the hindwing is a black transverse discal stripe not found in the other species. Although the species occurs from north India through the Archipelago to New Guinea and north Australia, it is absent from Java. The male genitalia are illustrated on Plate 2 (figure 8).

A curious butterfly which may be mentioned here is *G. payeni ciminius* (Fruhstorfer). The forewing is strongly falcate, indeed, almost sickle-shaped, at the apex, and the hindwing has a long spatulate tail between veins 3 and 4. The wings are ochreous brown with the distal halves darkened. In the female the wings are more ample and less falcate. The species is essentially montane in distribution, and flies from north India to Malaysia. It often flies at a considerable height and pace over the higher Malayan hills and sometimes settles for a moment on tree tops. Corbet caught a male drinking at a seepage at a rocky cliff near Ginting Simpah. Always rare in Malaya, the female exceedingly so.

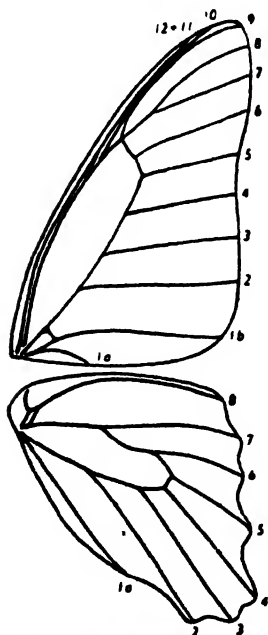


Fig. 23. *Graphium sarpedon* ♂. Venation.

Graphium sarpedon luctatus (Fruhstorfer)

Plate 33, figure 20, ♂; genitalia, Plate 2, figure 8a

The Common Bluebottle

This common species is easily recognised by the pale bluish-green macular band running from the apex of the forewing to the inner margin of the hindwing. There is some red spotting on the underside of the hindwing. The sexes are alike except for the scent fold on the hindwing of the male.

The green larva has a pair of short spines on each of the three thoracic segments and on the anal segment; there is a yellow transverse band on the metathorax, and a yellow stripe above the legs running from the metathorax to the anal segment. The larva feeds on such species of Lauraceae as *Machilus odofatissima*, *Cinnamomum*, *Alseodaphne* and *Liisea*. It lies in the centre of the leaf and is sluggish.

The butterfly is swift in flight; it is widely distributed throughout the Peninsula in wooded localities at lower altitudes, and numbers of males

may be seen congregated at moist spots on forest roads and river banks. The female is very rare in collections.

Distributed from Ceylon and India to China and Japan, and through the Archipelago and as far east as the Solomon Islands.

A species not very closely related to *G. sarpedon*, although immediately preceding it in the systematic arrangement, is *G. empedovana* (Corbet), which is probably a subspecies of the Papuan *G. codrus* (Cramer). The butterfly is larger than *G. sarpedon*, the forewing is falcate, and the crenulate hindwing has a moderately long and somewhat spatulate tail at vein 4. The upperside is greyish brown with a yellowish-green macular post-discal band running from vein 2 to vein 7 on the forewing. *G. empedovana* frequents forest roads at moderate elevations, and, although it keeps near the ground, it is very swift in flight and difficult to capture. The species is confined to Malaysia but it has been taken in the Langkawi Islands; although rare everywhere, and especially so in Malaya, Kloss found it was not uncommon on the small island of Mangalum, off the north-west coast of Borneo, during a visit in July, 1928.

G. empedovana has been bred in Java, and the food plant is *Hernandia peltata* (Pock-Steen, 1940).

Graphium doson evemonides (Honrath)

Plate 33, figure 21 ♂

The Common Jay

This is a swift-flying and widely distributed species in which all the Malaysian forms are referable to the single subspecies *evemonides*, except for the distinct subspecies *kajanga* (Corbet), from Tioman Island, in which both sexes are larger, and the spots on both surfaces are larger and more elongated than in the mainland race *evemonides*.

In general appearance, the butterfly recalls *G. sarpedon*. The wings are black, with a pale bluish-green macular fascia extending from the apical area of the forewing to the inner margin of the hindwing; in addition, there is in the cell of the forewing a single series of green streaks of which the basal one is continued to the inner margin; both wings have a series of green submarginal spots. On the underside the spots are larger and pale silvery green; the hindwing has a dark red-centred costal bar situated on the silvery median fascia and separated from the inner and distal black areas.

G. doson is widely distributed in Malaya, including Kedawi, and is commonest on forest roads at the foothills of the mountains. Like *G. sarpedon*, males are found congregated at moist spots and often in company with species of Pierid butterflies.

The larva is black or smoky brown until the last moult when it becomes dull green to rusty brown; the third thoracic segment has a pair of short spines. The food plants include *Cinnamomum*, and *Polyalthia* and other species of Anonaceae.

The species is distributed from Ceylon and India to south Japan and south China, and eastwards through Malaysia to the Philippines and the Lesser Sunda Islands.

Four similar species in order of abundance are *G. evemon*, *G. eurypylus*, *G. bathycles* and *G. arycles*. These all differ from *G. doson* in that the black costal bar on the hindwing beneath is not separated from all other black areas on the wing. In *G. eurypylus mecisteus* (Distant) and *G. evemon eventus* (Fruhstorfer) this black costal bar is united with the dark basal band, and only in the former species is it red-spotted. In *G. bathycles bathycloides* (Honrath) and *G. arycles arycles* (Boisduval) the costal bar is united with the dark post-discal area and is red-spotted in *G. arycles*. All these species occur in Kedawi and in lowland forest in Malaya proper, and the female is always scarce. All occur from India to Malaysia, but *G. eurypylus* extends eastwards through the Archipelago to New Guinea, the Bismarcks and Australia.

***Graphium agamemnon agamemnon* (L.)**

Plate 33, figure 22 ♂

The Tailed Jay

Above, the markings comprise apple-green spots on a black ground ; the hindwing has a short tail at vein 4 which is longer in the female. The purple-brown underside has the same green spotting as above, as well as dark patches and some red spotting on the hindwing. The butterfly is widely distributed in open country on the plains throughout the Peninsula, and occurs also in the Langkawi Islands and Pulau Tioman. The female is scarcer than the male, although by no means as rare as is the case with species in the *G. sarpedon* group. The male is often seen at *Lantana* blossom in the neighbourhood of towns.

The grown larva is from ochre-yellow to dark green, with each thoracic segment bearing a pair of black spines, those on the third segment arising from a small orange-yellow spot. The food plants include *Anona*, *Saccopetalum*, *Guatteria* and *Polyalthia* (all trees belonging to the Anonaceae), and *Michelia*.

G. agamemnon is distributed from north India to south China, and through the Archipelago to Papua, Queensland and the Solomon Islands.

***Graphium delesserti delesserti* (Guérin-Ménéville)**

Plate 33, figure 23 ♂

The Malayan Zebra

The butterfly is rather large, with the wings pale bluish grey and the veins blackened. The wing margins are black, and there is a row of black, submarginal, interneural spots ; the costal area of the forewing is black with grey markings, and the forewing cell has a series of well-

defined, elongate, grey spots. The underside is paler and with narrower black markings. The female is larger, greyer, and with a large conjoined spot in spaces 3 to 5 on the forewing, and a prominent but smaller black spot in space 7 on the hindwing. Both sexes have a yellow tornal spot on the hindwing, which is paler and rather obscure in the female.

The butterfly frequents well-wooded country at all elevations, and occasionally the males may be taken in some numbers at moist spots on the roadside. The butterfly is commonest during May and June, and when and where it occurs it is usually found in some numbers.

In its slow fluttering flight the exceedingly scarce female resembles a species of *Idea*.

The species is confined to Malaysia, but it appears to have become extinct in Java.

***Graphium ramaceus pendleburyi* (Corbet)**

Plate 33, figure 24, ♂

Pendlebury's Zebra

In its nomenclature this insect has been unfortunate. The species was described from Penang by Westwood under the preoccupied name of *Papilio leucothoe*. The next available name for the species is *P. ramaceus* Westwood (under which the Bornean race had been described), and Pendlebury named the Malayan race *dealbatus*. This latter name was found to be preoccupied by a *Papilio dealbatus* Rothschild and, finally, the butterfly was named by Corbet as above.

The wings are pale bluish grey with the veins blackened, and with pale grey submarginal spots on the black marginal borders; the costal half of the forewing is almost completely blackened except for a few diffuse subapical spots. On the underside, the costal half of the forewing and the basal area of the hindwing are dark brown.

The butterfly is not common and is confined to the forested foothills. Although the wing pattern resembles that of a *Danaus* species, it could hardly be mistaken for such by a collector, for its flight and habit of settling at moist spots disclose its identity immediately. *G. ramaceus* is restricted to Neomalaya.

The somewhat similar species, *G. macareus* and *G. megarus*, are essentially Kedawi insects, although the former occurs in Perak, and both differ from *G. ramaceus* in the clearly defined greenish grey transverse bars running obliquely across the forewing cell. Both are forest insects. *G. macareus perakensis* (Fruhstorfer) is the larger; it is paler than *G. megarus* and has only a single row of grey, post-discal streaks internal to the submarginal lunules on the hindwing above, while *G. megarus megapenthes* (Fruhstorfer) has two such rows of spots. In all three species the exceedingly rare females are larger and paler and, of course, they lack the scent fold on the hindwing. *G. macareus* occurs from Sikkim to

Malaysia and the Philippines, and *G. megarus* is distributed from Burma to Indo-China and Neomalaya.

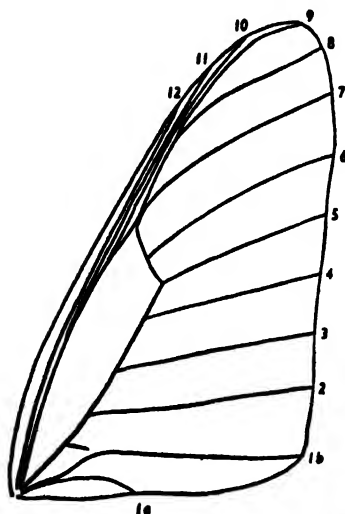


Fig. 24. *Lamproptera curius* ♂. Vena-tion of fore-wing.

Genus *Lamproptera* G. R. Gray

Structurally allied to *Graphium* but differs in many important respects as stated in the key. The forewing has veins 11 and 12 free. The male of *L. curius* has a basal tuft of white scent hairs in the dorsal fold on the hindwing above and, in both sexes, each tarsal claw has a tooth on its inner edge.

The larva, which resembles that of a *Papilio*, has been found on *Illigera*.

Distributed from Assam to south-east China, Indo-China, Malaysia, the Philippines and Celebes.

Key for the separation of the species of *LAMPROPTERA*

- | | | | |
|---|-----|---|------------------|
| 1 | (2) | Upperside hindwing post-discal band white. | <i>L. curius</i> |
| 2 | | Upperside hindwing post-discal band pale green. | <i>L. meges</i> |

Lamproptera meges virescens (Butler)

Plate 33, figure 25, ♂

The Green Dragontail

This butterfly is usually found near running water in sunlit spots in the forest, and its transparent wings and long drooping tails give it an appearance quite unlike that of any other Malayan insect. In flight, and even when settled, the wings are vibrated so rapidly that they appear as a bluish haze. *L. meges* is not common, but is found singly at all usual elevations in suitable localities.

The larva of *L. curius* has been found in Hong Kong feeding on *Illigera cordata*; in general appearance it resembles a *Papilio* larva, being dark greenish brown at first, and then changing to a dark apple green. The pupa is attached to the upper surface of a leaf of the food plant.

The species is distributed from Burma to south China, Malaysia, the Philippines and Celebes.

The much rarer *L. curius curius* (Fabricius) is found on the plains in Kedawi, but is restricted to the hills in Malaya proper, being found chiefly in parts of Perak. The hindwing discal band is pale green in *L. meges* and white in *L. curius*. *L. curius* occurs from Assam and China to Malaysia.

FAMILY PIERIDAE

Whites and Sulphurs

Although the Pieridae share many characters with the Papilionidae, they also show important differences. The forelegs are perfect in both sexes and the tarsal claws bifid. Hindwing with a precostal vein present in subfamily Pierinae, absent or greatly reduced in subfamily Coliadinae, and veins 1a and 1b always present. Cell closed in both wings. Hindwing with the inner margin channelled to receive the abdomen. Wings with the termens more or less smooth, except in *Dercas* where they are angled. The butterflies are usually of medium size. In some genera, the males have secondary sexual characters; androconial scales are present in *Ixias* and *Valeria*, abdominal tufts are found in *Appias* and *Saletara*, and sex patches in *Catopsilia* and *Eurema*.

The Malayan species of Pieridae are mostly white, yellow or orange-yellow, and, in many of the white species, the underside of the hindwing is brightly coloured. Usually, in the white species, the females are dark-dusted above and, in the yellow species, the females may be paler or even white. The genus *Delias* is essentially montane in Malaya, and a few other species are confined to the hills, but most Pierids are generally distributed in the Peninsula. Often the males are found congregated in large numbers at roadside puddles in bright sunshine, but, usually, the females prefer not to leave the forest shade. Many of the *Delias* females are quite uncommon, and, in the case of *Appias nero*, hundreds of males are seen to each female. A number of the local Pierid species are mostly found in secondary plant associations.



Fig. 25. *Eurema hecabe*. Fore-leg.



Fig. 26. *Hebomoia glaucippe*. Larva.

Occasionally, certain of the Pierids are found in great abundance and show pronounced migratory tendencies, and there are several reports of migrating swarms of species of *Delias*, *Appias* and *Catopsilia* in the Peninsula.

The white and yellow *Catopsilia* species are among the commonest butterflies of the Eastern tropics, and the polymorphism found in both sexes in one species has been responsible for much uncertainty regarding its specific status.

The genus *Eurema* comprises a number of species that are so similar



Fig. 27. *Hebomoia glaucippe*. Pupa.

in appearance that their correct determination may be a difficult matter without examination of the genitalia.

The larvae are elongate and smooth, or slightly hairy. Usually the colour is green and, especially in *Catopsilia* and *Eurema*, the caterpillars harmonise very closely with the leaves of the food plant.

The pupae are anally attached to a stem of the food plant, and supported, usually in an upright position, by a median silken girdle.

Key for the separation of the Subfamilies of PIERIDAE

Hindwing with a well-developed precostal vein, curved outwards (fig. 33). Palpi third segment long and hairy (except in *Ixias*, *Hebomoia* and *Valeria*, where it is short and oval). Wings usually white, often with the veins blackened, and with orange or red patches on the hindwing beneath in some species (*Ixias pyrene birdi* is yellow, with an orange-red subapical band on the upperside of the forewing in the male).

PIERINAE (page 114)

Hindwing with the precostal vein absent, or very short and directed inwards (fig. 34). Palpi third segment very short and usually not hairy. Antennae shorter than in Pierinae. Wings yellow, with black bordering on the forewing (except *Catopsilia pyranthe*, which has both wings white, and *C. scylla*, with forewing white and hindwing chrome-yellow); veins not black dusted.

COLIADINAE (page 130)

Subfamily PIERINAE

Larvae mostly on species of Capparidaceae and Loranthaceae.

Key for the separation of the Genera of PIERINAE

- 1 (20) Forewing with vein 8 absent. Wings not pale blue.
- 2 (3) Forewing with veins 5 and 6 arising from a point; vein 9 absent (fig. 28). Forewing not longer than 21 mm. *Leptosis*
- 3 Forewing with veins 5 and 6 widely separated at their origins; vein 9 present (fig. 32) (except in *Saletara* ♀). Forewing longer than 21 mm.
- 4 (19) Forewing with vein 7 arising from vein 6 well beyond the cell-end (fig. 29).
- 5 (18) Palpi third segment long and slender (fig. 30). Underside forewing not yellow.
- 6 (11) Forewing middle discocellular vein between veins 5 and 6 straight or very slightly curved.
- 7 (8) Forewing vein 10 absent (fig. 29). *Delias*
- 8 Forewing vein 10 present.
- 9 (10) Forewing with vein 9 comparatively long and prominent; apex produced. ♂ forewing costa serrate. *Prioneris*
- 10 Forewing with vein 9 very short, hardly visible, and may be absent. ♂ forewing costa not serrate. *Pieris*
- 11 Forewing middle discocellular vein between veins 5 and 6 angled or conspicuously convex.
- 12 (17) Forewing with vein 10 arising well before the end of the cell.
- 13 (14) Forewing termen distinctly excavate between veins 3 and 6. ♂ abdomen with two ventral hair pencils. *Appias*
- 14 Forewing termen straight or only slightly concave between veins 3 and 6.
- 15 (16) Forewing apex pointed and termen straight. Veins not black dusted. ♂ abdomen with a long dorsal hair pencil, as well as two ventral hair pencils as in *Appias*. *Saletara*
- 16 Forewing apex blunt. Veins prominently black dusted on underside, if not on upperside. ♂ without abdominal hair pencils. *Cepora*
- 17 Forewing with vein 10 arising just before the end of the cell. *Phrissura*
- 18 Palpi third segment short and oval (fig. 31). Underside both wings yellow. *Ixias*
- 19 Forewing with veins 6 and 7 separate, both arising from the cell (fig. 32). Upperside white, with apical area on forewing orange. *Hebomoia*
- 20 Forewing with all veins present (fig. 33). Wings pale blue and veins black dusted, very broadly so in ♀. *Valeria*

Genus *Leptosis* Hübner

Medium sized or rather small, fragile, white butterflies, with rounded wings.

The genus is represented by a single species in the Oriental Region, but several forms are present in equatorial and southern Africa.

***Leptosia nina malayana* Fruhstorfer**

Plate 34, figure 31, ♂; genitalia, Plate 2, figure 9

The Psyche

Formerly, this species was known under the preoccupied name *L. xiphia* (Fabricius). The specific name in use at present, however, can only be regarded as tentative, for it is possible that the Oriental *L. nina* is conspecific with the African *L. alcesta* (Cramer) in which case Cramer's name has priority.

L. nina is rather small and delicate, with the white wings unmarked above, except for the black-tipped apex and a black oblong subapical spot on the forewing. The underside is marked as above on the forewing, and the hindwing is delicately irrorated with greenish lines and streaks. The sexes are alike.

The butterfly occurs in open spaces in the forest on the plains and at moderate elevations, and is often locally abundant. It is feeble in flight, and rarely rises more than a few feet from the ground. In Sumatra it frequents bamboo thickets in the hills.

The caterpillar is a delicate green and feeds on *Capparis heyneana* and *Crataeva religiosa*.

The species is distributed throughout the Oriental Region. It is curious that such a weak flying butterfly should be so widely distributed. This may be due to the fact that the larval food comprises cultivated plants which have been spread by human agency.

Among the other species of butterflies with a somewhat similar distribution in Asia and Africa, and larvae that feed on cultivated

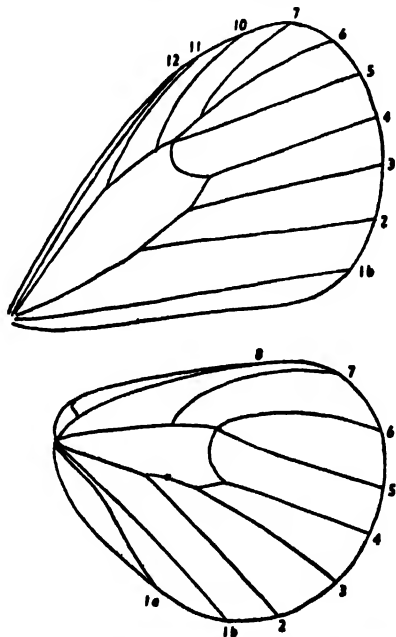


Fig. 28. *Leptosia nina* ♂. Venation.

plants, may be mentioned *Papilio demoleus*, *Eurema brigitta*, *E. hecabe*, *Danaus chrysippus*, *Melanitis leda*, *Phalanta phalantha*, *Zizeeria knysna*, *Zizina otis*, *Lampides boeticus*, *Pelopidas mathias* and *Parnara naso*. *Precis orithya* and *Zizula hylax* are remarkable in that they occur in the tropical belt in America and Africa as well as in the Indo-Australian Region.

Genus *Delias* Hübner

Rather large butterflies, with the upperside white or black, and the underside of the hindwing yellow, and marked with red in some species. In the white species, the female has the veins more broadly black dusted.

Except for *D. hyparete*, which occurs at all usual elevations, the Malayan species of *Delias* are montane in habit. There are no records from Kedawi, or from the Malayan islands. One species, *D. georgina*, is remarkable in that it occurs in a number of distinct races on isolated peaks in Malaya. The butterflies are on the wing during the earlier

hours of the day, and are in flight around the tree-tops. *D. ninus* and *D. aglaja* are often taken at rest on tree ferns. It is believed that the brightly coloured underside serves as a warning pattern to predatory animals. It appears that some species form a Müllerian mimetic association with species of Zygaenid moths (see pages 47, 49-50).

The larvae are gregarious and feed on *Loranthus*; they are remarkable for the dorsal row of hair tufts, and some species have lateral rows also.

The sixty-seven known species of *Delias* are distributed from Ceylon and India to China, and through the Archipelago to New Guinea, Australia and the Solomon Islands. The genus attains its greatest development in Papua.

(Basic literature: Talbot, 1928-

1937).

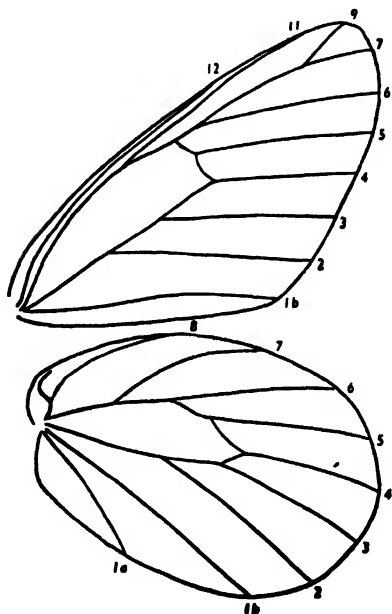


Fig. 29. *Delias aglaja* ♂. Venation.

Key for the separation of the species of *DELIAS*

- | | | |
|---------|---|----------------------|
| 1 (10) | Underside hindwing without red markings. | |
| 2 (9) | Underside hindwing predominantly yellow. Upperside hindwing without a yellow spot in space 7. | |
| 3 (4) | Underside hindwing with basal half or third of cell blackened. | <i>D. georgina</i> |
| 4 | Underside hindwing basal area of cell not blackened. | |
| 5 (6) | Underside hindwing veins not blackened. | <i>D. agostina</i> |
| 6 | Underside hindwing veins blackened. | |
| 7 (8) | Underside hindwing with a moderately broad black border, with white, diffuse interneural spots. | <i>D. singhapura</i> |
| 8 | Underside hindwing with the narrow black border hardly more than dilated vein endings with white interspaces. | <i>D. baracasa</i> |
| 9 | Underside hindwing predominantly black with the submarginal spots and tornal area yellow. Upperside hindwing black, with yellow oval spot in space 7. | <i>D. belladonna</i> |
| 10 | Underside hindwing with red markings. | |
| 11 (12) | Underside hindwing red spot confined to space 7. | <i>D. descombesi</i> |

- 12 Underside hindwing red spot not confined to space 7.
 13 (18) Underside hindwing basal area reddened, tornal area yellow.
 14 (15) Upperside hindwing base not reddened. *D. aglaja*
 15 Upperside hindwing base reddened.
 16 (17) Upperside hindwing red colour not below the cell, or only slightly so. ♂ upperside hindwing red area outwardly bounded by bluish grey. ♀ upperside forewing bluish grey scaling in the cell and in space 1b continued to the wing base. *D. ninus*
 17 Upperside hindwing red colour extended broadly below the cell. ♂ ♀ upperside hindwing red area outwardly bordered by black. ♀ forewing bluish grey scaling not continued to the wing base in the cell and in space 1b. *D. acalis*
 18 Underside hindwing tornal area broadly reddened, basal area yellow *D. hyparete*

Delias hyparete metarete Butler

Plate 33, figure 26 ♂

The Painted Jezebel

The basal half of the underside of the hindwing is bright yellow, and the termen has a bright red marginal border; the veins are dusted with black. Above, the wings are white, with the veins black dusted in the outer areas, and more heavily so in the female.

The butterfly frequents open woods, and is found occasionally in gardens, being seen on the wing even at dusk. Although most abundant on the plains, it is often quite common at elevations up to 4,000 feet.

The larva is yellow and hairy, and the pupa is yellow with shining black spots. The food plant is probably a species of *Loranthus*.

The species occurs from India and south China through Malaysia to the Philippines.

Delias ninus ninus Wallace

Plate 34, figure 27 ♀

The Malayan Jezebel

This, the commonest of the montane species of *Delias*, is to be found on every hill station above 3,000 feet throughout the Peninsula. On the upperside of the forewing the veins are so broadly dusted with black that the ground colour is predominantly black. The hindwing is yellow with a red basal patch, which is outwardly edged with bluish grey in the male and with black in the female. The underside is rather similar, but the veins on the hindwing are more heavily black dusted, and the red basal patch is separated from the yellow area by a clearly defined black border. The female resembles the male, but the forewing is more rounded and the red basal patch on the hindwing is larger. A. R. Sanderson (see Poulton, 1921, 1922) observed species of *Delias* (apparently mainly *D. ninus*) at Bukit Kutu, Selangor, migrating from one valley to another in the evening and back again in the morning. This movement continued for several days.

D. ninus is confined to Neomalaya.

Two species which may be confused with *D. ninus* are *D. aglaja* and *D. acalis*.

D. aglaja parthenope (Wallace) (see plate 29, fig. 1 ♀; plate 2, fig. 10, genitalia) bears a general resemblance to *D. ninus*, but, on the hindwing above, the yellow colour is much more restricted, and the red basal spot is obsolete. The larva is brown with yellow hairs, each segment has a yellow transverse band, and there is a lateral series of black dots. The larvae are gregarious, and they have been found feeding on a species of *Nauclea*; it is probable that *Loranthus* also is a food plant. In Malaya, the species is largely confined to the forested hills where, like *D. ninus*, it may be seen in flight or at rest on tree ferns during the earlier hours of the day. There are, however, authentic records of *D. aglaja* occurring on the plains in Malaya. Biggs (1881) spoke of it as a common coastal butterfly, and described it as being found sometimes in an apparently endless stream, all the butterflies flying in the same direction and numbering twenty to thirty per minute from any one point. This movement formed a belt several miles broad which extended far inland from the coast, and the butterflies continued to pass over fixed points from morning to night for a fortnight or more. E. R. Wrench took several specimens on Singapore Island in 1901. Le Cerf (1912) recorded a cloud of the Sumatran race of *D. aglaja* in the Straits of Malacca seen in 1907. W. R. Allen (in a letter to C. L. Collenette, dated 5.viii.1922) stated that the species was quite common one year in Singapore, although not seen before or since.

D. acalis perakana Talbot is larger than the two species just considered, and it can be separated from *D. ninus*, which it closely resembles, in that the red colour on the upperside of the hindwing extends broadly below the cell. *D. acalis* is much rarer than *D. ninus* in Malaya, and appears to prefer higher altitudes. *D. aglaja* is wide ranging, occurring from India and south China, through Malaysia, to the Philippines, but *D. acalis* (formerly known by the preoccupied name of *D. thysbe* (Cramer)) is not found south of Malaya.

D. belladonna malayana Pendlebury (see plate 29, fig. 2 ♀) is also predominantly black above, with diffuse whitish spots on both wings, and a clearly defined, yellow, oval, basal patch along the costa and a yellowish patch at the tornus of the hindwing. The underside is black, and the hindwing spots are mostly yellow. As far as Malaya is concerned, *D. belladonna* is, as yet, known only from Cameron Highlands at altitudes between 5,000 and 6,000 feet. Abroad, it occurs from Sikkim to west China, and through Neomalaya (except Borneo) to Celebes.

***Delias baracasa dives* Nicéville**

Plate 34, figure 28 ♀

The Common Yellow Jezebel

The wings are white with the veins black dusted, and the underside of the hindwing is entirely yellow. The butterfly is found in rather

open forest and is by no means uncommon on Fraser's Hill at elevations between 4,000 and 4,500 feet.

D. singhapura singhapura (Wallace) is one of the rarest of Malayan butterflies, and very few specimens have been obtained since the species was first described in 1867. Although Wallace stated that his male holotype came from Singapore, there is no doubt, in our opinion, that it was taken on Mount Ophir by Wallace in 1854. *D. singhapura* differs from *D. baracasa* in the more pointed forewing, and in the distinct black marginal border, with whitish or yellowish diffuse spots, on the underside of the hindwing.

D. singhapura is practically confined to Neomalaya, while *D. baracasa* occurs in Neomalaya and the Philippines.

In *D. georgina orphne* (Wallace), which is another of Wallace's discoveries on Mount Ophir, the upperside has the outer margins rather broadly decorated with black, and the deep yellow underside of the hindwing has the basal portion of the cell and some of the interspaces broadly shaded with black. The female is heavily black dusted above. *D. georgina* is especially interesting on account of its occurrence on isolated peaks in the Peninsula in subspecies distinct from that found on the Main Range: these races are based on differences in the intensity of the black markings on both surfaces. The subspecies *zenobia* Pendlebury is confined to the Main Range, and *keda* Talbot and *tahanica* Rothschild are the forms from Kedah Peak and Gunong Tahan respectively. *D. georgina keda* was reported by Pendlebury as being locally abundant on Kedah Peak in 1928. In *D. descombesi eranthos* Fruhstorfer the upperside of the male is intensely white (the female has the forewing heavily black dusted) and the underside of the hindwing in both sexes is bright yellow with a red streak along the costal margin. The butterfly is strong on the wing, and is taken occasionally in small numbers on Cameron Highlands and Fraser's Hill. *D. georgina* occurs throughout Neomalaya and in the Philippines and Celebes; *D. descombesi* is found from Sikkim to Malaya, and also in the Lesser Sunda Islands.

Genus *Prioneris* Wallace

Rather large and robust butterflies with the forewing apex produced. The wings are white above with the veins black dusted in the apical half of the forewing; the hindwing beneath is yellow with the veins blackened.

The bluish green larvae are clothed with soft white hairs and there are tubercles of which those at the head and sides have black dots. The pupa is light green, and the head has a sharp tip. The food plant is *Capparis*.

Distributed from Ceylon and India to Malaysia.

Key for the separation of the species of *PRIONERIS*

- 1 (2) Underside hindwing without a red basal spot
- 2 Underside hindwing with a red basal spot.

P. thestylis
P. philonome

Prioneris philonome themana* FruhstorferPlate 34, figure 29 ♂***The Redspot Sawtooth**

The butterfly is large and robust, with the wings white, and the veins blackened in the outer areas. The hindwing beneath has the basal two-thirds yellow, the tornal area is rather densely dusted with black, and there is a small red basal spot. The female is darker above, and is much rarer than the male.

P. philonome is a common insect, and frequents wayside water seepages in company with other Pierids. It is essentially a forest species, and is found in Malaya proper at all usual elevations. Nothing is known concerning the early stages*. *P. philonome* is distributed from Sikkim to Indo-China and Malaysia.

The only other Malayan species of *Prioneris* is *P. thestylis malaccana* Fruhstorfer, in which the under surface of the hindwing is entirely yellow with black dusted veins. This species is practically confined to the hills in Malaya, although occasional specimens are taken at lower altitudes. Abroad, it extends to northern India and southern China, but it is confined to the Asiatic mainland.

It was first pointed out by Wallace (1867) that the *Prioneris* species bear a strong superficial resemblance to certain species of *Delias* flying in the same area. For instance, *P. philonome* is somewhat similar to *Delias hyparete* and the female of *P. thestylis* is remarkably like *Delias belladonna*. It seems doubtful if these resemblances have any mimetic significance as the *Prioneris* species are much faster on the wing.

Genus *Pieris* Schrank

The wings are white, and usually have a few black post-discal spots and a black apical border on the upperside of the forewing. The female is more heavily marked than the male.

The well known "White" butterflies are distributed throughout the Palaearctic Region and North America, and, in recent years, the genus has gained a foothold in the Antipodes.

The European "Small White" butterfly, *Pieris rapae* (Linnaeus), which is a pest on cabbage and other cultivated crucifers, has been carried all over the world, and is established in such remote countries as Hawaii, New Zealand and Tasmania. An obvious "escape" from imported plant material was taken near the Department of Agriculture buildings in Kuala Lumpur in December, 1917. The single Malayan record of *P. napi montana* Verity, from Perak, may also refer to an introduction, for the butterfly is not found nearer Malaya than the South Shan States, in Burma, in a wild state. The male genitalia of *Pieris napi* are shown at Plate 2, figure 11, the female genitalia of *Pieris rapae* on Plate 2, figure 12.

* See Appendix, p. 493.

It seems probable that *P. canidia malayica* Martin was introduced into Singapore from Hong Kong within the last half century, for it is not uncommon on the island, although absent from the Malayan mainland and Siam. Female specimens from Singapore differ from those of other races in the smaller and distinctly double spot in space 1b on the forewing.

(Basic literature: Martin, 1909; Moulton, 1923; Corbet, 1937a.)

Key for the separation of the species of *PIERIS*

- | | | |
|---|--|-------------------|
| 1 | (2) Underside hindwing veins black dusted. | <i>P. napi</i> |
| 2 | Underside hindwing veins not black dusted. | |
| 3 | (4) Upperside forewing black margin with the inner edge not dentate, and not extending below vein 4. | <i>P. rapae</i> |
| 4 | Upperside forewing black margin with the inner edge dentate and extending to below vein 3. | <i>P. canidia</i> |

Genus *Cepora* Scudder

Cepora and the three following genera are closely related structurally, although sufficiently differentiated superficially for the identification of the respective genera to be a comparatively easy matter. In *Cepora* alone is the cubitus on the forewing above dark dusted, and the male is without the abdominal hair pencils found in the three following genera.

The butterflies are rather deliberate in flight, and prefer the lowlands: they are essentially forest dwellers. The males of some species congregate at moist spots, but the females are scarce.

The larvae are green and covered with small tubercles, each bearing a short white hair. The genus is represented from Ceylon and India to south China, and through the Archipelago as far east as New Caledonia and the Fiji Islands.

Key for the separation of the species of *CEPORA*

- | | | |
|---|--|-------------------|
| 1 | (2) Underside hindwing not deep yellow, being pale greenish yellow in the male and white in the female, with the veins green dusted in both sexes. | <i>C. nerissa</i> |
| 2 | Underside hindwing deep yellow, with the veins blackened. | |
| 3 | (4) Upperside hindwing white, except for the tornal area, which is faintly yellow tinged. | <i>C. nadina</i> |
| 4 | Upperside hindwing costal half white in ♂, pale yellow in ♀; tornal half deep orange in ♂, deep orange-red in ♀. | <i>C. iudith</i> |

Cepora nadina andersoni Distant

Plate 34, figure 30 ♂

The Lesser Gull

The wings are white above, with the distal portion of the forewing broadly dusted with black; the underside of the hindwing is deep ochreous yellow, with the cell and space 5 lighter than the rest of the wing. In the female, the upperside is more generously black dusted, and the tornal area of the hindwing is yellowish.

C. nadina is rather rare; it is found in well wooded country, and usually at moderate altitudes. It flies at no great height from the ground, and is taken singly. The species occurs from Ceylon and India to Indo-China, Malaya and Sumatra. The Sumatran subspecies

fawcetti (Butler) is remarkable for the deep greyish green hindwing underside.

C. nerissa dapha (Moore) is practically confined to Kedawi as far as Malaya is concerned. On the underside the veins are dusted with yellow and black, thus giving the wings a greenish aspect. In both sexes there is a black, diffuse, rounded spot in space 3 on the upperside of the forewing and, in the female, the veins on the forewing are rather heavily blackened.

Like *C. nadina*, the larva* feeds on species of *Capparis*. The butterfly prefers open country, and occurs from Ceylon and India, through Malaysia, to the Lesser Sunda Islands and Celebes. In Borneo it appears to be replaced by *C. pactolicus* (Butler).

***Cepora iudith malaya* Fruhstorfer**

Plate 34, figure 32 ♂

The Orange Gull

This butterfly cannot be confused with any other Malayan Pierid, as the tornal half of the upperside of the hindwing is a bright chrome-yellow. The whole of the underside of the hindwing is yellow with the tornal area orange. The female has the veins on the forewing more broadly black dusted than the male.

C. iudith is widely distributed on the plains in Malaya, occurring from the Langkawi Islands in the north to Pulau Ubin and Singapore in the south. On the islands of Aor and Tioman distinct subspecies are found in which the males have narrower black bordering on the upper side of both wings while the females are much blacker. The female of the subspecies *siamensis* (Butler), from Pulau Aor, is so heavily black dusted on both surfaces that little of the yellow colouring is visible, while the female of subspecies *talboti* Corbet, from Pulau Tioman, is intermediate between the Aor and mainland forms.

C. iudith is sometimes abundant in March and April at sandy spots on the banks of forest streams and at moist spots on jungle roads, at elevations of about 1000 feet and below. The female is always very rare and is found only in heavy forest.

The species is usually regarded as being restricted to south Burma and Malaysia, but there can be little doubt that *C. iudith* extends right through the Archipelago to New Guinea where, for part of its range, it is usually known by the preoccupied name of *C. aspasia* (Stoll).

Genus *Phlaeura* Butler

Forms a link between *Cepora* and *Appias*, having the wings rounded as in the former genus.

In the single species *P. aegis*, the male is without secondary sexual characters in Neomalaya but, in the Philippines (including Palawan) and

* See Appendix, p. 493.

Celebes, it develops a ventral abdominal hair tuft anterior to the saccus. On this account the Neomalayan forms lacking the hair pencil were formerly separated as *Udaiana* Distant.

(Basic literature: Corbet, 1946b.)

***Phrissura aegis cynis* (Hewitson)**

Plate 34, figure 33 ♂; genitalia, Plate 2, figure 14

The Forest White

The male is pale greenish white above, with the apex and termen of the forewing shaded with black; the underside is similar but of a more greenish hue, and the forewing apex is greyer. In the much rarer female, the wings are more broadly margined with black, and the basal portion of the forewing is heavily black dusted.

The butterfly is restricted to the forested plains and is very local. At times, the males may be taken in some numbers in favoured localities at puddles on forest paths. We found the male of this species quite common in Sungei Buloh Forest Reserve, Selangor, but secured very few females over a period of years. On the occasion of a visit to Trolak Forest Reserve, Perak, however, we found the female almost as abundant as the male. *P. aegis tiomana* (Moulton) is the darker race from Pulau Tioman and Pulau Aor.

Commenting on the occurrence of this species in Sumatra, Martin stated that it "never occurs in the black-soil forests of Delhi, but as soon as the red-soil forests of Langkat and Serdang are entered there it appears at once."

Genus *Appias* Hübner

The forewing apex is acute, strongly produced, and even falcate in some species, but it is always more rounded in the female. The forewing has vein 9 short in both sexes, and with vein 10 arising about midway between the origin of vein 11 and the apex of the cell. The male has a pair of long hair pencils situated ventrally on the membrane between the eighth abdominal segment and the saccus; rarely, these tufts are present in the female. They are absent in both sexes in *A. lalassis*, on which account some authors place this species in *Lade* Nicéville. The male genitalia are simple and show little specific differentiation: indeed, there appears to be none between *A. nero*, *A. paulina* and *A. albina*.

The male butterflies are rapid in flight, and are often found congregated at moist spots on forest roads, and on the banks of streams and rivers. Usually, the females are rarer than the males and may be found visiting flowers. Some of the species are migratory, and *A. paulina* and *A. albina* have been reported frequently as taking part in mass movements in Ceylon and south India.



Fig. 30. *Appias lalassis*. Palp.

The larvae are usually green with two anal points, and the pupae resemble somewhat those of *Pieris rapae*.

Distributed from Ceylon and India, through the Archipelago, to Australia and Solomon Islands.

Key for the separation of the species of *APIAS*

- 1 (2) Underside hindwing entirely yellow, except for the broad black border. ♀ upperside forewing cell almost entirely blackened. *A. lyncida*
- 2 Underside hindwing not so coloured, except in some rare ♂-forms of *A. paulina* and *A. albina*, in which the distal part of the cell on the forewing above is always white. *A. lyncida*
- 3 (4) Upperside deep orange-red (♂) or crimson-red (♀). *A. nero*
- 4 Upperside white, usually with black bordering.
- 5 (16) Underside hindwing tornal half not deep yellow.
- 6 (7) Underside hindwing veins prominently blackened, and yellow dusted in the distal area in the female; costa conspicuously yellow at the base. *A. libythea*
- 7 Underside hindwing veins not blackened, and costa not yellow at the base.
- 8 (9) Upperside forewing with a black cell-end spot separated from the black bordering. Forewing strongly falcate. *A. talassia*
- 9 Upperside forewing without a separated black cell-end spot. Forewing not strongly falcate.
- 10 (11) Upperside forewing black apical border very broad, and covering about half of the wing; on this border is a broad white stripe more or less parallel to the dorsum. *A. pandione*
- 11 Upperside forewing without a broad white stripe at the cell-end.
- 12 (13) Upperside forewing with white subapical spots in spaces 5 and 6 on the black apical border. *A. indra*
- 13 Upperside forewing not so marked. ♂ upperside forewing without a broad black border. ♀ upperside forewing usually with a broad black border with three to five white subapical spots; a prominent black spot in space 3 may or may not be conjoined with the black border.
- 14 (15) ♂ upperside forewing unmarked except for the costa and termen very narrowly black dusted. ♀ upperside forewing with four or five white subapical spots, and the black spot in space 3 more or less separated. *A. albina*
- 15 ♂ upperside forewing with a prominent black spot in space 3, veins black dusted in the apical area, and the vein endings dilated to form a marginal series of triangular spots. ♀ upperside forewing with not more than three white subapical spots, and the black spot in space 3 hardly distinguishable from the black border. *A. paulina*
- 16 Underside hindwing tornal half deep yellow, veins black dusted, and tornus blackened. *A. cardena*

Appias lyncida vasava Fruhstorfer

Plate 34, figure 34 ♂

The Chocolate Albatross

In the male the wings are white above, with a dentate black border; the female has the upperside so heavily black dusted that the wings are almost black with a few broad, whitish, discal streaks. In both sexes the hindwing beneath is lemon-yellow with a rather broad, inwardly diffuse, black, distal border.

The butterfly is found in abundance in forest country in Malaya proper (curiously enough, it is not known from Kedawi), and large numbers of males may often be seen congregated at moist spots on the roadside and along the banks of streams. The rarer female is usually found flying among the forest undergrowth. Although commonest on the plains, the species occurs at all usual elevations.

The yellowish green larva has yellow dorsal and lateral stripes, and feeds on *Crataeva religiosa* and *Capparis micracantha*. The period from ovum

to adult is 17 days. The species is widely distributed throughout the Oriental Region.

On the upperside, both sexes of *A. libythea olferna* Swinhoe somewhat resemble *A. lyncida*, but the black markings are less extensive in the female, and the underside of the hindwing is white (yellow dusted in the female), with a yellow basal streak along the costa and the veins dark dusted. Although common in Ceylon, India and Burma, *A. libythea* is of sporadic occurrence in Malaya and, although a few specimens have been collected in Singapore during recent years, it is doubtful if the insect is really established in the Peninsula.*

In general appearance *A. cardena perakana* (Fruhstorfer) suggests a *Delias*. The wings are white, and the veins in the apical third of the forewing and the distal margin of the hindwing are black dusted; on the hindwing, beneath, the inner margin is yellow and the tornus is shaded with black. The male is often taken singly at moist spots on forest paths at low elevations, but the butterfly is also to be caught while flying over hill tops at elevations of from 3,000 to 5,500 feet. A purely Neomalayan species.

***Appias nero figulina* (Butler)**

Plate 34, figure 35 ♀

The Orange Albatross

This species has the same wing contours as *A. lyncida*, but is orange- or brick-red above, while the underside is yellowish orange. The only markings on the upper side of the male are the blackened veins but, in the female, the wing margins are bordered with black and a very irregular black line extends from mid costa to the tornus on the forewing. The life history is unknown.

Males are common, and in distribution and habits they closely resemble the preceding species. They are most in evidence from March to June, and large numbers may often be taken settled on moist sand on the banks of forest streams.

The female of *A. nero* is surprisingly rare; it appears to prefer higher elevations than the male (about 2,000 feet), and is not found at moist spots on the ground but seeks flowering plants in the forest.

The species is found from Sikkim through Burma and Malaysia to the Philippines, Celebes and Buru.

***Appias indra plana* Butler**

Plate 34, figure 36 ♀

The Plain Puffin

The wings are white, with a broad, irregular, black margin on the forewing extending from mid-costa to the tornus; on this black margin

* See Appendix p. 493.

are two small, diffuse, white spots. The female differs from the male in that the hindwing is margined with black. Neither sex is likely to be confused with any other local species.

A. indra occurs in well-wooded country at moderate elevations throughout the Peninsula, and is not rare. The species ranges from Ceylon and India to south China and Malaysia.

A. pandione lagela (Moore) and *A. lalassis* Grose-Smith are two montane or submontane species which are not found much below 1,000 feet, and the former occurs in some abundance on Cameron Highlands at 5,000 feet. In both species the forewing is strongly produced and the termen is smoothly excavated between veins 3 and 6. In *A. pandione* the very broad black apical area on the forewing extends from the base of the costa to vein 2 near the tornus, and has white rounded spots in spaces 3 and 6 as well as an outwardly rounded, elongate, white spot extending from the middle of space 4 to vein 11. In the female, the black hindwing border is more diffuse, and the wing is black dusted in the tornal area. In *A. lalassis* the forewing has the apical area more narrowly blackened, there is a diffuse rounded black spot in space 3 (conjoined with the black apical area in the female), and a small black spot at the cell-end. The female is faintly tinged with yellow and has a diffuse black border on the hindwing. *A. pandione* occurs from India to Malaysia, but *A. lalassis* is confined to Burma, Siam and Malaya.

A. albina and *A. paulina* resemble each other in wing shape and pattern and, indeed, some authors have separated them as constituting the genus *Catophaga* Hübner on account of the slightly more oblique position of the lower discocellular vein between veins 4 and 5 on the forewing. *A. albina albina* (Boisduval) is not common, and prefers well-wooded localities at elevations of about 2,000 feet. The male is white above, and is unmarked except for the very narrow, black, costal shading on the forewing. In the rare female the upperside of the forewing has a broad black border extending from the mid-costa to the tornus, this border being excavated between veins 2 and 3, and, in some individuals, there is a rounded black spot almost separated from the distal border in space 3. The black apical border has 4 or 5 white spots (genitalia, Plate 2, fig. 13).

A. paulina distantii (Moore) is most in evidence in Kedawi and on the east coast of the Peninsula, although odd individuals are taken occasionally on the western side of the Main Range. The male of *A. paulina* has a prominent black spot in space 3 on the forewing, and this spot is joined to the black costal border by an irregular band; the veins between this band and the black distal border are lightly black dusted so that, in some examples, it appears as if a broad black apical area has a series of contiguous white spots. The female closely resembles that sex of *A. albina*, but there are only three white spots on the black apical border on the upperside of the forewing. In subspecies *grisea* Moulton, from Pulau Tioman and Pulau Aor, the wing bases are dusted with leaden grey.

The larva of *A. albina* has been found on *Capparis heyneana*. Both *A. albina* and *A. paulina* are widely distributed, ranging from Ceylon and India, through the Archipelago, to Papua and Australia.

Genus *Saletara* Distant

Closely related to *Appias*; apart from the different male genitalia, the chief distinction between the two is that the male *Saletara* has a long dorsal hair tuft on the eighth abdominal segment as well as the two ventral hair pencils found in *Appias*. The forewing is more acute than in *Appias*, and vein 9 is present, although very short, in the male but absent in the female.

The early stages are unknown. The single species is distributed from the Nicobar Islands and Malaya through the Archipelago to New Guinea.

Saletara liberia distanti Butler

Plate 34, figure 37 ♂; genitalia, Plate 2, figure 13a

The Malaysian Albatross

The wing contours of this butterfly separate it from certain *Appias* species to which it bears a general resemblance. Above, the male is creamy white, almost pale yellow, and is unmarked save for a rather narrow black border along the costal and distal margins of the forewing. The under surface is of a deeper yellow tint. In the female the costal and distal margins on the forewing and the distal margin on the hindwing are broadly bordered with black.

S. liberia is rarely found above 2,000 feet; the males are often common locally, and may be taken congregated at moist spots on forest roads. Females are rare and are confined to the forest.

S. liberia is one of three or four Malaysian species of butterflies occurring in the Nicobars but not otherwise found in the Indian area. The species is represented on all the large islands throughout the Archipelago, and, east of the Weber Line, the male has the upperside greyish blue.

Genus *Ixias* Hübner

In most species, the yellow or creamy white wings have an orange or yellow subapical patch on the upperside of the forewing. In the male, the upper surface is sparsely sprinkled with androconial scales.

The larval food plant is *Capparis*. Distributed throughout the Oriental Region, except the Philippines.

(Basic literature: Gabriel, 1943.)

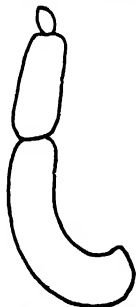


Fig. 31. *Ixias pyrene*. Palp.

Ixias pyrene birdi* DistantPlate 22 and Plate 34, figure 38 ♂; genitalia, Plate 3, figure 15***The Yellow Orange Tip**

In both sexes the wings are yellow above and beneath, the costal and distal margins on the forewing and the distal margin on the hindwing are shaded with black, and, on the forewing, there is a prominent subapical band which is orange-red in the male and yellow in the much scarcer female.

The butterfly is found in glades in primary forest on the lowlands in Malaya proper. It is distinctly local and never abundant.

The larva is dark grass-green, covered with small red dots, and with an interrupted whitish lateral band.

In the Malayan hills, at altitudes above about 3,000 feet, occurs the subspecies *alticola* Pendlebury, which is marked like *birdi*, but the ground colour on the upperside is white. Unlike the lowland race, *alticola* favours open spaces and may be seen flying along the roadside on Fraser's Hill.

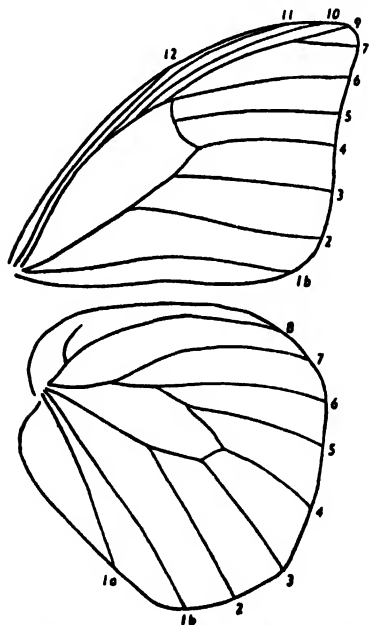


Fig. 32. *Hebomoia glaucippe* ♂.
Venation.

A third subspecies, *verna* H. Druce, is confined to the Langkawi Isles and north Kedah, and frequents secondary growth. In the Kedawi race the ground colour is pale creamy yellow, and the orange subapical band on the forewing is sullied in both sexes.

I. pyrene is a widespread species occurring throughout the range of the genus. It is curious that the female of the Bornean race *undatus* Butler is aberrant and resembles a *Delias* form with the hindwing yellow beneath.

Genus *Hebomoia* Hübner

This genus comprises the largest Asiatic Pierids, the forewing being longer than 40 mm. in the smallest forms. The wings above are white or yellow, with a prominent orange-red apical patch on the forewing.

The genus occurs throughout the Oriental Region and in the Moluccas.

Hebomoia glaucippe aturia* FruhstorferPlate 34, figure 39 ♂***The Great Orange Tip**

In this, the largest Malayan Pierid, the upper surface is white, and the apex of the forewing has a large orange triangular patch outlined with

black. The much scarcer female is darker, and has a series of large, black, post-discal spots on the hindwing. On the underside, the hindwing and the apical half of the forewing are buff with small darker striations, and, on the hindwing, a dark brown line runs from the base to the mid-termin. When the butterfly settles on the ground with closed wings it harmonises closely with its surroundings.

H. glaucippe prefers the plains, but is taken occasionally on the hills. The males are found at moist spots on the banks of forest streams, or in the vicinity of quarries, but the females rarely leave the security of the forest. The males are speedy on the wing, and are not easily captured in flight. The butterfly is most in evidence in May and June. The larva is green, with a pale lateral stripe, and feeds on species of Capparidaceae; it is most commonly found on *Crataeva religiosa* and, outside Malaya, on the climber *Capparis moonii* (figs. 27 and 28).

The subspecies *aturia* occurs throughout Malaya proper and in Kedawi; on Pulau Aor is found the subspecies *anomala* Pendlebury, in which the male is pale sulphur-yellow above, although the female is whitish. The species ranges throughout the Oriental Region.

Genus *Valeria* Horsfield

The genus is distinctive among Oriental Pieridae in that all the veins are present on the forewing, and the abdomen is longer than usual in the family.

The males are whitish blue, with blackened veins, while the females are *Danaus*-like in pattern and flight, and are polymorphic in some parts of the range. The male has androconial scales spread over the apical and discal area of the hindwing above, these scales being very sparse in *V. valeria*.

The larval food plants comprise species of Capparidaceae.

The genus is represented from Ceylon and India through the Archipelago to New Guinea.

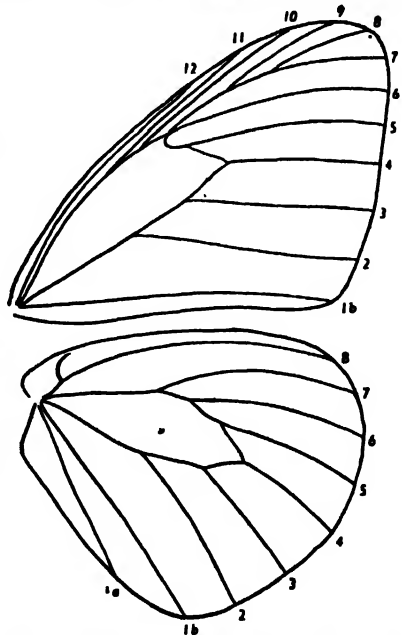


Fig. 33. *Valeria valeria* ♀. Venation.

Valeria valeria lutescens (Butler)

Plate 35, figure 40, ♂; genitalia, Plate 3, figure 16

The Wanderer

The male is pale blue above, with the wing veins marked in black,

and is a common and conspicuous butterfly at the forest edge at elevations up to about 3,000 feet. It has a swift, restless flight and is a frequent visitor to certain flowering trees.

In the female (plate 30, fig. 2) the wing bases are yellowish, and the veins are so broadly dusted with black that the butterfly has a very different appearance from the male; in fact, it resembles *Danaus aspasia* so closely and its flight is so similar that the two are not easily distinguished in the field. It is worthy of remark that in Ceylon, and other parts of its range where *D. aspasia* is absent or rare, the female *V. valeria* lacks the basal yellow patch on the upper surface and so resembles one of the bluish grey species of *Danaus*. The female *V. valeria* is rare and is found only in primary forest.

The larva is dark green with white lateral patches on the first and eighth abdominal segments; it is clothed with fine hairs, and has two anal points. It has not been bred in Malaya, but the food plant is known to be *Capparis heyneana*.

In Kedawi occurs the subspecies *anaïs* (Lesson), which differs from *lutescens* in the male in that the forewing cell is closed by blackened discocellular veins (see plate 30, fig. 1), and in the female by lacking the yellow areas.

The species is found from India and Burma through Malaysia to the Philippines and Lesser Sunda Islands.

Subfamily COLIADINAE

The butterflies of this subfamily are the nearest Malayan representatives of the familiar Clouded Yellows of other regions. Their larvae feed on Leguminosae.

Key for the separation of the Genera of COLIADINAE

- 1 (6) Hindwing with a short and weakly developed precostal vein, which may only be indicated by an angle in vein 8 in *Catopsilia*.
- 2 (3) Hindwing precostal vein short and stout. Forewing apex between veins 7 and 9 (fig. 34). *Catopsilia*
- 3 Hindwing precostal vein slender and curved inwards. Forewing apex between veins 6 and 7.
- 4 (5) Hindwing caudate at vein 4. Forewing apex produced to a point. *Dercas*
- 5 Hindwing rounded. Forewing apex rather blunt. *Gandaca*
- 6 Hindwing without a precostal vein. Uppernside yellow with black bordering. *Eurema*

Genus *Dercas* Doubleday

Antennae very short, less than one third the length of the forewing. On both wings the cell is short and much less than half the wing length.

The species are montane in habit throughout the range which extends from India and south China to Neomalaya. The early stages are unknown.

D. verhuelli herodorus Fruhstorfer, which is easily recognised by the angled wings and crenulate termen, is sulphur-yellow in the male, and paler lemon-yellow in the female, with a blackish brown quadrate spot at the apex of the forewing, and a diminishing sinuate black margin

extending towards the tornus ; the forewing cell is closed by a faint elongate orange spot.

The insect is not rare on some of the Malayan hill stations at altitudes between 3,000 and 4,500 feet ; occasionally, individuals are taken at lower levels. The species occurs from Sikkim to Burma, China and Neomalaya.

Genus *Catopsilia* Hübner

These are among the most abundant butterflies of the eastern tropics, and *C. pomona* and *C. pyranthe* have strong migratory habits, although mass movements in Malaya have been reported only in the former species.

The butterflies are moderately large and robust, with the wings white or pale yellow above (the hindwing is chrome-yellow in *C. scylla*), and the forewing costa and termen bordered narrowly in the male and broadly in the female with black. In most forms there are indications of reddish post-discal markings on the underside.

The male secondary sexual characters comprise an oval sex patch near the base of space 7 on the hindwing above, and a strong hair pencil near the base of the dorsum on the forewing beneath.

The larvae are green with a pale lateral stripe, and the favourite food plant is *Cassia*.

The genus is distributed throughout the whole of the Indo-Australian Region (except New Zealand) ; it occurs also in tropical Africa and allied genera are found in tropical America.

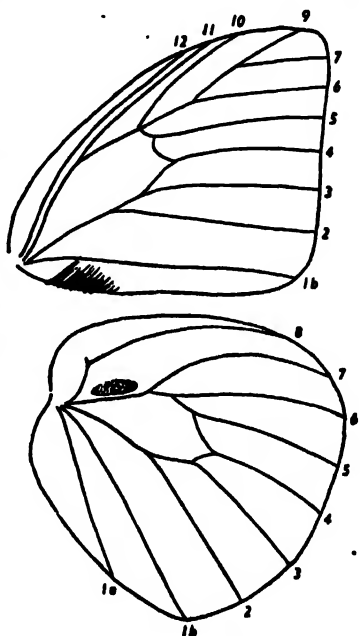


Fig. 34. *Catopsilia pomona* ♂. Venation.

Key for the separation of the species of CATOPSILIA

- | | | |
|---|--|--------------------|
| 1 | (2) Underside with faint brownish transverse strigae. | <i>C. pyranthe</i> |
| 2 | Underside without transverse strigae. | |
| 3 | (4) Upperside both wings pale yellow or white. | <i>C. pomona</i> |
| 4 | Upperside forewing white, upperside hindwing deep chrome-yellow. | <i>C. scylla</i> |

Catopsilia pyranthe pyranthe (Linnaeus)

Plate 35, figure 41 ♂

The Mottled Emigrant

The wings are greenish white above, and the forewing has a black apical border (broader in the female), and a black cell-end spot, which may be faint in individuals. The underside is of a darker, greenish-

ochréous hue, and there are numerous reddish brown transverse strigae. *C. pyranthe* is the commonest and most widespread species of *Catopsilia* in Malaya, being always in evidence in the neighbourhood of gardens and villages on the plains.

The larva is pale green, with a whitish lateral stripe bearing a series of minute black dots on its upper edge. Although larger, it is somewhat similar in appearance to that of the "Small White" butterfly, *Pieris rapae*. It rests along the mid-rib of the leaf and harmonises very closely with the food plant. When fully grown, the larva leaves the plant, which is usually a species of *Cassia*, and turns to a green pupa on a neighbouring shrub, building, etc. The duration of the pupal stage in Malaya is from five to ten days. The butterflies emerge about 8 o'clock in the morning.

There are records of *C. pyranthe* taking part in migratory flights in Ceylon and south India, although there are no reports of such behaviour in Malaya. The species is common throughout the Oriental Region. As would be expected with a migratory species, individuals from Malaya, Sumatra, Borneo and Java show no constant differences and no sub-specific separation can be made.

Catopsilia pomona pomona (Fabricius)

Plate 35, figures 42 ♂, 43 ♀; genitalia, Plate 3, figure 17

The Lemon Emigrant

Two series of well differentiated forms of this widespread species occur throughout its range :

(a) The "*crocale*" forms, with the antennae black above, and the underside without silvery spots at the cell-ends. In the male, the upperside is creamy white with the basal third lemon-yellow, and the forewing apex is narrowly bordered with black (♂-f. *alcmeone* (Cramer)). The female is creamy white above, with the costal margin of the forewing and both termens bordered with black ; there are black submarginal markings, a black cell-end spot on the forewing, and the wing bases are tinged with yellow (♀-f. *jugurtha* (Cramer)). The ♀-f. *crocale* (Cramer), apparently confined to Kedawi as far as our fauna is concerned, has, on both wings, a broad black distal border bearing a series of large, diffuse, interneural whitish spots.

(b) The "*pomona*" forms, with the antennae red above, and the underside with silvery spots, outlined with red, at the cell-ends. The ♂-f. *hilaria* (Stoll) resembles the ♂-f. *alcmeone* above. In the usual ♀-f. *pomona* (Fabricius) the wings are pale yellow to yellowish white, with the black bordering and markings greatly reduced. The ♀-f. of the "*pomona*" type with blood-red blotches on the underside is *catilla* (Cramer).

Whether the *pomona* and *crocale* forms constitute a single species or not has been a matter for controversy for many years, and, although both forms have never been bred from ova known to be laid by the same female, both forms have been taken *in copula* recently on too many occasions for there to be much doubt now regarding their conspecificity. The genitalia of the two forms are identical in both sexes. Nevertheless, it must be admitted that, although intermediates occur occasionally,



Fig. 35. Distribution of *Catopsilia pomona*.

Catopsilia pomona and *Hypolimnas bolina* are the only species of *Rhopalocera* found in both Madagascar and the Oriental Region and yet absent from the mainland of Africa. The arrangement of the spines in the aedeagus in the Malagassy representative of *C. pomona* is different from that found in the species throughout the rest of its range.

there is rarely any difficulty in deciding to which form any individual specimen pertains, and to treat them as distinct species is excusable. It is very desirable that carefully controlled breeding experiments should be carried out with these two common and interesting butterflies which provide such admirable evidence of the reality of evolution.

The species is usually abundant on the plains in secondary growth, and in the vicinity of human dwellings, but occasionally it is found in forest country, and even at altitudes up to about 3000 feet. The butterflies are often found settled at moist spots on the roadside. They are strong on the wing, and frequently take part in migratory flights. We can record the following instance of such a flight in Malaya. During the two years prior to June, 1930, *C. pomona* was by no means abundant in the state of Selangor; in April, 1930, during a visit to the east coast of Pahang, the species was seen in large numbers. On 1st June, several individuals were observed flying along the road at the Ginting Simpah Pass from Pahang into Selangor and, two days later, large numbers were seen in steady flight in the same direction. A few months later, *C. pomona* was plentiful throughout Selangor. Cardon (1927) reported the appearance of thousands of *C. pomona* near Lenggong, Upper Perak, from 26th to 28th May, 1927.

The life history of the species is similar to that of *C. pyranthe*. Food plants include *Cassia* species (especially *C. fistula* and *C. siamea*) and *Butea frondosa*.

C. pomona ranges from Ceylon to Australia and the Solomon Islands, and the typical race occurs in every part of Malaysia. Distinct races which occur in Madagascar and Mauritius are remarkable for the obsolete black bordering in the male and much reduced black markings in the female in both the *pomona* and *crocale* forms. These African races are distinctive also in that the aedeagus is armed with two large and two smaller spines, and lacks the two series of minute spines found in the Oriental forms.

(Basic Literature: Drohsin, 1933; Wheeler, 1943.)

Catopsilia scylla cornelia (Fabricius)

Plate 35, figure 44 ♂

The Orange Emigrant

Above, the forewing is white, with a black distal border, and the hindwing is chrome-yellow. In the rarer female the paler hindwing has a series of black marginal spots, and the forewing has a black post-discal fascia.

The insect is rather local, but may be fairly common where it occurs. Although not often found in gardens, it is frequently seen flying along grassy patches by the roadside where *Mimosa pudica* is growing. In Malaya it is never found at more than moderate elevations.

The larva is dark velvety green, with a whitish lateral stripe, and the minute black dots on the upper edge of this stripe are most dense on the thoracic segments. *Cassia fistula* and *C. obtusifolia* have been reported as favourite food plants in Java, and the larva has been found on *Tephrosia candida* in Malaya.

The species is distributed from south Burma, through Malaysia to Australia and the Moluccas but, curiously enough, it appears to be absent from Borneo.

Genus *Eurema* Hübner

The butterflies are comparatively small, and are readily recognised by the deep lemon-yellow wings bordered with black. The underside is marked with a few small rusty red spots, and there is, in some forms, a similarly coloured spot at the apex of the forewing.

In all the Malayan species except *E. brigitta*, the male has an elongate sex patch above and below the basal portion of the cubital vein on the forewing beneath. Most of the species can be identified by the number and shape of the harpes on the male valva illustrated for all species on Plate 3, figs. 18-25. A wide range of species of Leguminosae are included among the larval food plants.

The genus is circumtropical in distribution.

(Basic literature: Corbet and Pendlebury, 1932.)

Key for the separation of the species of *EUREMA*

- 1 (2) Underside forewing without cell spots. Upperside forewing black apical border serrated, but not more deeply excavated in spaces 2 and 3. ♂ without a brand.
E. brigitta (18-19 mm.)
- 2 Underside forewing with one, two or three cell spots. Upperside forewing black border deeply excavated in spaces 2 and 3. ♂ underside forewing with a brand lying along the cubital vein.
- 3 (16) Upperside forewing black border not continued broadly along the dorsum.
- 4 (7) Underside hindwing with a small black spot at the base of space 7.
- 5 (6) Underside forewing with three spots in the cell. Underside hindwing with the black spot at the base of space 7 faint.
E. blanda (20-22 mm.)
- 6 Underside forewing with two spots in the cell, and a large cleft reddish brown apical spot. Underside hindwing with the black spot at the base of space 7 well defined.
E. simulatrix (23-24 mm.)
- 7 Underside hindwing without a spot at the base of space 7.
- 8 (11) Underside forewing with two cell spots.
- 9 (10) Upperside forewing black border below vein 2 at right angles to dorsum or sloping towards the base. Forewing apex more or less quadrate. ♂ upperside deep yellow; ♀ upperside paler yellow. Forewing usually longer than 18 mm.
E. hecabe (18-21 mm.)
- 10 Upperside forewing black border below vein 2 cut away towards the dorsum. Forewing apex rounded. Upperside pale greenish yellow, ♀ paler. Forewing usually less than 18 mm.
E. ada (14-18 mm.)
- 11 Underside forewing with a single spot in the cell.
- 12 (13) Underside forewing apical area entirely dark brown.
E. sari (18-20 mm.)
- 13 Underside forewing apical area not entirely darkened.
- 14 (15) Upperside forewing black distal border not more deeply excavated in space 2 than in space 3; inner edge of black border in spaces 1a and 1b inclined slightly towards the tornus. ♂ upperside yellow, ♀ paler.
E. andersoni (18-20 mm.)
- 15 Upperside forewing black distal border in space 2 more deeply excavated than in space 3; inner edge of black border in spaces 1a and 1b inclined slightly towards the base. ♂ upperside greenish yellow, ♀ greenish white.
E. laticola (19-21 mm.)
- 16 Upperside forewing black border continued broadly along the dorsum.
E. silene (22-23 mm.)

Eurema hecabe contubernalis* (Moore)Plate 29, figure 6. Plate 35, figure 45 ♂***The Common Grass Yellow**

E. hecabe is the commonest butterfly in the eastern tropics, ranging from Ceylon and Japan eastwards through the Archipelago to Australia and the Fiji and Tonga Islands. Often, it may be found at rest in large numbers at moist spots on forest roads, and, although most abundant on the plains, it is common on the mountains up to about 5000 feet.

The wings are yellow, with black bordering on the upperside; the markings beneath are blackish brown. Usually the female is paler and more broadly black bordered than the male, but the species exhibits such a wide range of variation in size, colour and markings that no two specimens are alike.

The larva of *E. hecabe* is yellowish green with a pale lateral line; its habits are similar to those of the *Catopsilia* species and, although the usual food plant of the larva appears to be a species of *Pithecellobium*, other Leguminosae such as *Cassia*, *Wagatea*, *Acacia*, *Caesalpinia*, *Albizzia* and *Sesbania* are also used.

Apart from *E. brigitta senna* (C. and R. Felder), in which the forewing black border is regularly scalloped, and not deeply excavated between veins 2 and 4 as in the other species, the remaining Malayan species of *Eurema* are remarkably similar. The important characters in identification are the number of cell spots, and the nature of the apical markings on the underside of the forewing.

Like *E. hecabe*, *E. simulatrix tecmessa* (Nicéville) and *E. ada iona* (Talbot) have two cell spots, but the former species is larger and, on the underside, has a large, almost cleft, reddish brown, apical spot on the forewing, and a dark streak at the base of space 7 on the hindwing. In *E. ada*, which is the smallest Malayan *Eurema*, the greenish yellow wings are more rounded, and the apical area of the forewing beneath is almost unmarked. The upperside is never even faintly black dusted.

E. blanda snelleni (Moore) has three cell spots on the underside of the forewing, and a dark basal streak in space 7 on the hindwing.

Of the remaining *Eurema* species, each of which has a single cell spot on the forewing, *E. tilaha nicevillei* (Butler) is distinctive in that the black distal border on the forewing is continued along the dorsum to the base, and *E. sari sodalis* (Moore) is easily recognised by the entirely darkened reddish brown apical spot on the forewing beneath. The separation of *E. andersonii andersonii* (Moore) and *E. lacteola lacteola* (Distant) (plate 35, figure 46 ♂) may present some difficulty in the male; in Distant's species the female is greenish white. In *E. andersonii* the forewing beneath has usually a rather broad dark subapical stripe, and there may be present a dark diffuse spot near the margin in space 1b. *E. lacteola* is more lightly marked beneath, the subapical stripe may be indicated only by a few

diffuse spots, and space 1b is unmarked. An important distinction between the males of the two species is that, on the forewing above, the black border in spaces 1a and 1b slopes towards the tornus in *E. andersonii* and towards the base in *E. lacteola*.

Most of the Malayan *Eurema* species are widely distributed at the usual elevations, but *E. andersonii* and *E. ada* are rather local, although the former may occur in some abundance. *E. tilaha* is almost always taken singly, although persisting in some localities for years. *E. lacteola* seems to prefer the hills. *E. brigitta*, which occurs also in tropical Africa, is essentially a local and montane species in Malaysia. The type specimen of *senna* was obtained by le Comte de Castelnau in "Malacca Interior" [probably Johore] but, in more recent years, it was known only from Penang Hill until A. B. Cross and van Ingen, when prisoners of war, took it on Singapore Island.

Genus *Gandaca* Moore

Similar to *Eurema* in appearance and structure, but, on the hindwing, vein 7 arises well before the end of the cell and not at or just before the cell-end as in *Eurema*, and there are important differences in the male genitalia. Moreover, of all the Oriental Pieridae, *Gandaca* alone has present on the wings abundant anthoxanthine pigment of the flavone type (Ford, 1941). For this reason, Ford considers it possible that *Gandaca* is the most primitive genus of the Coliadinae.

The male is without secondary sexual characters. The early stages are unknown.

The single species is distributed from Sikkim through the Archipelago to New Guinea*.

Gandaca harina distanti Moore

Plate 35, figure 47 ♂

The Tree Yellow

Above and below the sexes are pale lemon yellow and unmarked, except for the narrow black apex on the upperside of the forewing. In the rather paler female the forewing black border has a dentate projection along vein 4. The subspecies *aora* Moulton, from the east coast islands of Tioman and Aor, has the forewing black distal border much reduced.

The insect is widely distributed in the Peninsula, and occurs in well wooded localities: it is commonest on the plains but is not rare on some of the hill stations. Although it is often found in the same localities as the *Eurema* species, it is a more shade-loving butterfly, and males are never found congregated at moist spots on the roadside or on the banks of forest streams.

The species ranges from Sikkim to New Guinea and is never found in any abundance.

* See Appendix, p. 493.

FAMILY DANAIDAE

Tigers and Crows

This family, which is almost entirely confined to the tropics, is of considerable interest because many of its members serve as models in mimetic associations, and the Danaid wing pattern is repeated in certain Oriental species of Papilionidae, Pieridae, Satyridae and Nymphalidae.

The family characters are : Eyes naked. Forelegs, imperfect and useless for walking in both sexes, terminate in a spiny corrugate tarsal knob in the female. Forewing with all veins present and vein 1b bifurcate at the base. Hindwing with a precostal vein. Cells of both wings closed by tubular veins. Wings ample and margins not dentate or caudate. Secondary sexual characters are usually present on the wings in *Danaus* and *Euploea*, and consist of one or more patches of specialised scales. In all genera the males carry, at the anal end of the abdomen, a pair of extrusible hair-pencils which emit a strong and pungent odour and are believed to be brought into use during courtship.

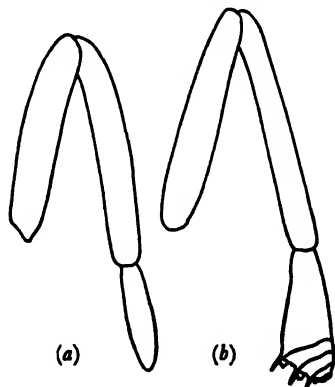


Fig. 36. *Euploea mulciber*.

(a) Male (b) Female fore-leg

The male genitalia are remarkable in that the uncus and tegumen are usually obsolete, or if present much reduced.



Fig. 37. *Euploea mulciber*. Larva.



Fig. 38. *Euploea mulciber*. Pupa.

The butterflies are rather large in size, and, except in *Euploea*, the wings are vitreous. In many species the males, at least, are gregarious, and all show a remarkable tenacity of life. The Danaid butterflies are so distinctive in appearance that there can never be any doubt regarding their family, or even generic, relationship.

Many of the species are common, some exceedingly so, but a few are rare or local in habitat. A few are restricted to the mountains, but all Danaid butterflies are lovers of the sun and prefer open but sheltered localities. They are slow and undulating in flight.

The rather cylindrical larvae are smooth, with from two to four pairs of long, fleshy filamentous processes; usually they are conspicuously

coloured and gregarious. The food plants are almost exclusively species of Asclepiadaceae and Apocynaceae, all of which are lactiferous. The pupae are short and stout, rather barrel-shaped, with a metallic glitter, and suspended by the tail.

Key to the Genera of DANAIIDAE

- 1 (6) Hindwing vein 8 not parallel to vein 7, running very close to the costa throughout its length (fig. 2). Wings partially or wholly vitreous.
- 2 (5) Hindwing precostal vein arising at the origin of vein 8 (fig. 2). Forewing less than 60 mm.
- 3 (4) Antennal club slight and gradually formed. Forewing black with greenish or bluish grey vitreous stripes and spots, or orange, with the veins blackened (except in *D. chrysippus*), and a white subapical band. *Danaus*
- 4 Antennal club ovate and rather abruptly formed. Wings pale vitreous grey, with discal and marginal black spots. *Ideopsis*
- 5 Hindwing precostal vein arising well beyond the origin of vein 8. Forewing longer than 60 mm. Wings pale vitreous grey, with discal and marginal spots. *Idea*
- 6 Hindwing vein 8 parallel to vein 7, meeting the costa at an angle (fig. 40). Wings usually blackish brown, with a blue lustre—not vitreous. *Euploea*

Key to the Larvae of DANAIIDAE

- 1 (2) Larva with two pairs of filamentous processes, on segments II and 8, those on the thoracic segment being the longer. *Danaus* (bluish grey species), *Ideopsis*
- 2 Larva with more than two pairs of filamentous processes.
- 3 (6) Larva with three pairs of filamentous processes.
- 4 (5) Filamentous processes on segments II, 2 and 8, those on the thoracic segment being the longest. *Danaus* (orange-brown species)
- 5 Filamentous processes on segments II, III and 8. *Euploea* (subgenera *Stictoploea*, *Calliploea* and *Euploea*, see page 148)
- 6 Larva with four pairs of filamentous processes.
- 7 (8) Larva banded black and white with bright red spots or patches. *Idea*
- 8 Larva not as above, although *Euploea leucostictos* is black with pale yellowish white bands and red lateral spots.
- 9 (10) Filamentous processes on segments II, III, 1 and 8. *Euploea* (subgenus *Tropsichrois*)
- 10 Filamentous processes on segments II, III, 2 and 8. *Euploea* (subgenera *Adigama* (*redtenbacheri*), *Crastia* (*core*) and *Salpinx*, see page 148)

Genus *Danaus* Kluk

The wing venation is rather variable throughout the genus, and vein 11 may be free or anastomosed with vein 12.

The males of *D. similis*, *D. vulgaris* and *D. juvena* are without obvious secondary sexual characters, those of *D. chrysippus*, *D. genutia*, *D. melanippus*, *D. affinis*, *D. gautama*, *D. limniace* and *D. hamata* have a single scent-patch in space 1b on the upperside of the hindwing, and the remaining Malayan species have patches of specialised scales on the hindwing near the apices of veins 1a, 1b and 2, with a thickening of veins 1a and 1b where they pass through these patches.

The larvae have two or three pairs of filamentous processes and are usually brightly coloured ("warning colours") and make no attempt at concealment. The barrel-shaped pupae are usually green, with brown rings and spots.

The genus is represented in all continents but attains its greatest development in the Indo-Australian Region.

Danaus plexippus, the "Milkweed" or "Monarch" butterfly, is the

classic example of a butterfly migrant. Over one hundred and fifty specimens of this North American species have been recorded from Britain during the last seventy years, and, during this period, it has gradually extended its range westward across the Pacific Ocean. It has long been established in Hawaii; it was first reported from Tonga in 1863 and from Queensland and Celebes eight years later. Although the species is now a regular inhabitant of the large Pacific islands as far west as Formosa and the Moluccas, it has never obtained a footing in Malaysia, in spite of numerous statements to the contrary. The only Malayan record, if it can be so considered, refers to a specimen taken on board the s.s. "Ravenna" near Pulau Jarak, in the Straits of Malacca, on 19th April, 1889. There appears to be no other Malaysian record.

(Basic Literature: Moulton, 1921; Talbot, 1939a; Talbot, 1943c.)

Key for the separation of the species of *DANAUS*.

- 1 (8) Forewing orange-brown.
- 2 (3) Upperside veins not blackened. *D. chrysippus*
- 3 Upperside veins blackened.
- 4 (7) Underside hindwing dark border not inwardly edged with ferruginous wedge-shaped spots.
- 5 (6) Upperside hindwing orange, or white with at least the outer area suffused with orange. *D. genutia*
- 6 Upperside hindwing white without a trace of orange. *D. melanippus*
- 7 Underside hindwing dark border inwardly edged with ferruginous wedge-shaped spots. *D. affinis*
- 8 Forewing with bluish grey markings.
- 9 (20) Upperside forewing without a long, narrow streak above the cell.
- 10 (11) Hindwing basal half yellow. *D. aspasia*
- 11 Hindwing basal area not yellow.
- 12 (17) Upperside forewing basal cell stripe partially or entirely separated from the irregular cell-end spot.
- 13 (16) Upperside forewing basal cell stripe entirely separated from the spot beyond.
- 14 (15) Upperside forewing basal streak in space 1b and the spot above conjoined or almost conjoined. Upperside hindwing cell entirely pale greyish blue, except for a narrow, dark, longitudinal streak. *D. limniace*
- 15 Upperside forewing basal streak in space 1b and the elliptical spot above entirely separated. Upperside hindwing with a greyish blue, V-shaped mark in the cell. *D. hamata*
- 16 Upperside forewing basal cell stripe conjoined with the spot beyond by a very narrow line on the anterior edge of the cell. *D. gaulama*
- 17 Upperside forewing cell entirely bluish grey.
- 18 (19) Upperside hindwing bordered with black or blackish brown, and with greyish blue submarginal spots. *D. melaneus*
- 19 Upperside hindwing broadly bordered with reddish brown, and with very obscure submarginal spots. *D. sila*
- 20 Upperside forewing with a long narrow streak above the cell.
- 21 (24) Upperside forewing cell stripe (which may be divided longitudinally by a narrow dark streak), continuous from the base to the end of the cell.
- 22 (23) Upperside hindwing cell entirely bluish grey, except for a very narrow, dark, longitudinal streak which does not reach the cell-end. *D. aglea*
- 23 Upperside hindwing cell black, with upper and lower narrow bluish grey stripes, and a small greyish blue dash near the cell-end. *D. aglaoides*
- 24 Upperside forewing cell stripe broken, the basal streak partially or wholly separated from the irregular cell-end spot.
- 25 (28) Upperside forewing with the large elongate spot in spaces 1a and 1b distinctly separated into two narrow stripes which are only united at the base of the wing.

- 26 (27) Upperside forewing with the basal spots in spaces 2 and 3 more or less elliptical ; the cell-end spot outwardly slightly indented. Upperside bluer than in *D. vulgaris*. *D. similis*
 27 Upperside forewing with the basal spots in spaces 2 and 3 narrow and wedge-shaped ; the cell-end spot outwardly deeply indented. *D. vulgaris*
 28 Upperside forewing with the large elongate spot in spaces 1a and 1b entire, but, usually, with a central, narrow, longitudinal streak. *D. juvenis*

***Danaus chrysippus alcippoides* (Moore)**

Plate 35, figure 48 ♀; genitalia, Plate 3, figure 27 ♂, 28 ♀

The Plain Tiger

D. chrysippus has the forewing fulvous orange, with a broad black apical border bearing a series of conjoined white spots ; in specimens from Kedawi, Penang and Singapore, the hindwing is concolorous with the forewing (form *chrysippus* (Linnaeus)) (Plate 29, figure 3), but those from Malaya proper south of Penang have the hindwing almost white (form *alcippoides* (Moore)).

The larva has pale blue and black transverse stripes, with yellow subdorsal spots, and black-tipped, carmine, paired filamentous processes on the IInd thoracic and on the 2nd and 8th abdominal segments. It feeds on *Asclepias curassavica* and *Calotropis gigantea*. The barrel-shaped pupa is green, pink or white, with a dark median transverse line and a series of dark spots near the head.

The species can hardly be described as rare in Malaya, but it is local and found only where the food plant abounds. Thus it generally occurs in the neighbourhood of villages and is not found in the forest. Although *Asclepias curassavica* grows on some of the Malayan hills (we saw it on Maxwell's Hill, near Taiping, in 1929, at an altitude of 4,500 feet), the butterfly does not leave the plains.

D. chrysippus ranges from Greece and Asia Minor to tropical Africa, and through southern Asia and the Malay Archipelago to New Guinea.

***Danaus genutia intermedia* (Moore)**

Plate 35, figure 49 ♂

The Common Tiger

Both this species and the American "Monarch" butterfly have passed under the name of *D. plexippus* for many years, and there has been a prolonged controversy as to which species has prior claim to the name. On the evidence of the Linnaean collection, Linnaeus had only the oriental butterfly before him when he wrote the description of *plexippus* for the tenth edition of his *Systema Naturae* in 1758, and one of his specimens is labelled with this name in Linnaeus' handwriting. This specimen is illustrated on Plate 29 (figure 4). The first part of the Linnaean description can apply only to the Monarch, a supplementary phrase however caused it to embrace the Oriental species, and indeed may be said to restrict the name to that species. The case was considered by the

International Commission on Zoological Nomenclature at its meeting in Paris in July, 1948, because of its difficulty. On the basis of the full evidence available the Commission decided that the name *Danaus plexippus* must in future be used only for the American species known generally as The Monarch or Black-veined Brown, which is a rather larger insect than *D. genutia* with more pointed forewings that never have any trace of a white subapical patch.

D. genutia has the same colouring as *D. chrysippus*, but the veins are strongly marked with black. As in the case of this latter species, the Langkawi form of *D. genutia* has the hindwing coloured like the forewing (form *genutia* (Cramer)), but in Malaya proper the hindwing is white with the border tinged with orange. Judging by old records, it would appear that, until quite recently, the unicolorous forms of both these *Danaus* species predominated in the Peninsula, but they have been supplanted by the forms with white hindwings; Martin observed the same decline of the orange form of *D. chrysippus* in north-east Sumatra.

The larva of *D. genutia* is banded with pale bluish white and black, with white and yellow spots: the IInd thoracic segment has a pair of long, black-tipped, crimson filaments, which are very active when the animal moves, and pairs of similar but shorter filaments are situated on the 2nd and 8th abdominal segments. The barrel-shaped pupa is pale lustrous green, with black and metallic gold and silver markings. The only recorded Malayan food plant is *Raphistemma pulchellum*.

Although generally distributed throughout Malaya, *D. genutia* is local and usually found in colonies in areas of secondary growth surrounded by primary forest, and is confined to the plains.

A very similar species is *D. melanippus hegesippus* (Cramer), which has the hindwing entirely white and the veins broadly shaded with black in the distal area. *D. melanippus* is much more abundant than *D. genutia*, and may be found everywhere on the plains except in heavy forest. The larva is blackish, with grey stripes and spots and a subdorsal series of yellowish spots; the three pairs of slender filamentous processes are carmine with black tips.

D. genutia occurs from Ceylon and India to China, and through the Archipelago to Queensland, while *D. melanippus* is not found further east than Celebes.

D. affinis malayana (Fruhstorfer) is somewhat similar to *D. genutia* and *D. melanippus*, but is smaller and can be readily distinguished by the ferruginous wedge-shaped post-discal spots on the hindwing beneath. It flies very close to the ground and, on this account, it is difficult to capture. It is confined to mangrove forests, and is known only from a few favoured localities on the Malayan west coast. Abroad, this species is not uncommon on the south coast of Siam, and it occurs in the Nicobar Islands and eastwards through the Archipelago. The larval food plant is *Ischnostemma selangorica* (= *Vincetoxicum carnosum*).

Danaus aspasia aspasia* (Fabricius)Plate 35, figure 50 ♀***The Yellow Glassy Tiger**

The ground colour of the wings is predominantly bluish grey, with the usual black markings, and each wing has a bright yellow basal patch, that on the hindwing covering about half of the wing surface. The butterfly cannot be confused with any other Malayan *Danaus*, but the female of the Pierid *Valeria valeria* (see page 130) resembles it closely in appearance and flight. The insect is not uncommon, and frequents forest rather than open country ; it is found throughout the Peninsula, on the hills as well as the plains. The velvety black larva is ornamented with yellow spots and numerous white dots ; filaments grey to black. It is believed to feed on a species of *Gymnema*. *D. aspasia* occurs throughout Malaysia and eastwards but has reached only the southern extremity of Burma.

Danaus melaneus sinopion* (Fruhstorfer)Plate 36, figure 53 ♂***The Chocolate Tiger**

The wings are predominantly bluish grey, with the veins and distal margins blackened as usual. The underside is lighter and, on the hindwing, the light vitreous areas are bordered with dark chocolate brown. The abdomen is yellowish brown. Of all the Malayan *Danaus* species, the male of this butterfly emits the strongest scent. It is a forest insect, and is not often taken below 1000 feet. Although it is common, the early stages are unknown.

D. melaneus ranges from north India and Burma to Indo-China and Malaysia. The representatives from Sumatra and Borneo differ considerably, and they were formerly regarded as distinct species.

D. sita ethologa (Swinhoe) is rather similar in appearance but larger, and, on the hindwing, the veins and the broad distal border are a rich reddish brown. The abdomen is dark, blackish brown. *D. sita* occurs exclusively on the hills, and, although it cannot be considered rare, it is much less common than *D. melaneus*. It is not found south of Malaya.

A third species in which the forewing cell is entirely bluish grey is *D. aglea melanoides* (Moore). This butterfly, which is only occasionally taken south of Kedawi, differs from the two afore-mentioned species in the smaller size, the whiter ground colour, and the greyer abdomen. The claret-brown larva is marked with yellow and bluish white spots in the dorsal half ; filaments claret-red with a white stripe. It feeds on *Tylophora tenuis* and other species of Asclepiadaceae.

Danaus agleoides agleoides* (C. & R. Felder)Plate 35, figure 51 ♀***The Dark Glassy Tiger**

Formerly known by the preoccupied name *D. eryx* (Fabricius), this species can be identified by the rather narrow bluish grey markings and in that the pale streak in the forewing cell is divided into two or three patches by narrow black longitudinal streaks. It is common everywhere throughout Malaya in forested country at all elevations. The black or dark brown larva has numerous large yellowish white spots, and the carmine filamentous processes are tipped with black. It feeds on *Gymnema* and *Lasianthus*. *D. agleoides* is essentially Malaysian in distribution, but extends as far north as south Burma.

Danaus vulgaris macrina* (Fruhstorfer)Plate 35, figure 52 ♀; genitalia, Plate 3, figure 29***The Blue Glassy Tiger**

In all the remaining species of *Danaus* the markings are bluish grey, and the pale basal streak in the forewing cell is separated, or almost separated, from an irregular spot in the distal part of the cell.

D. vulgaris has the habitus of *D. agleoides* and, as in that species, the bluish grey cell streaks on the hindwing form a V with its apex at the base of the wing; there is a small detached streak between the arms of the V at the distal end of the cell. *D. vulgaris* is very common throughout the Peninsula at all elevations. Abroad, it is distributed from south Burma to Malaysia.

The very similar *D. similis persimilis* (Moore) (see plate 29, figure 5 ♂) is larger and has bluer markings. It occurs from north India and south China to Kedawi and is found also in Ceylon, the Nicobar Islands and in Sumatra—a somewhat unusual distribution.

It appears that the larvae of the two species are similar. They are black with numerous small round or rhomboid white dots, while the two pairs of filamentous processes are dark orange with black tips. The larva of *D. similis* feeds on a species of *Gymnema*.

D. juvenia sitah (Fruhstorfer) is a Malaysian species which appears to be common on Pulau Tioman and other of the east coast islands, and is taken occasionally on the east coast of the Peninsula. It is distinctive in having the whole of the hindwing cell filled with greyish blue. The larva is dark brown with obscure pale spots; the carmine filaments are tipped with black; and recorded food plants are *Piper longum*, *Pergularia odoratissima* and *Gymnema*.

The only remaining Malayan *Danaus* likely to be met with is *D. hamata septentrionis* (Butler), which was formerly known under the preoccupied name of *D. melissa* (Cramer). It is a large butterfly with

narrow, elliptical greenish blue markings on the forewing. The basal streak in the forewing cell is very narrow, and the hindwing cell is marked with a narrow V which has a very small streak between the arms of the V. The butterfly is erratic in appearance, but occurs throughout the Peninsula in forest country at all elevations. The larva is white with transverse black bands on each segment and an orange-brown lateral stripe; filaments black. Abroad, the species is found from Ceylon and India eastwards through the Archipelago.

D. limniace leopardus (Butler) can be differentiated from *D. hamata* by the broader bluish markings, and particularly in having the hindwing cell entirely bluish grey except for a very narrow black central streak. Although not uncommon in south Burma, it is doubtful if *D. limniace* is resident in Malaya; it is unknown from Sumatra, a single female has been recorded from Borneo, but it occurs in Java and the Lesser Sunda Islands. The butterfly is found in open country on the plains.

Genus *Ideopsis* Moore

The adult is rather large with the forewing strongly produced at vein 6. Structurally, closely allied to the *similis* group of the genus *Danaus*. The male has vein 1b on the hindwing above broadly bordered with buff brown specialised scales.

The larva has paired filamentous processes on the IInd thoracic and 8th abdominal segments.

Distributed through the Eastern Archipelago from Malaya to New Guinea.

(Basic literature: Moulton, 1921; Talbot, 1940.)

Ideopsis gaura perakana Fruhstorfer

Plate 36, figure 54 ♂

The Smaller Wood Nymph

This butterfly resembles a small *Idea*, but has more rounded hindwings. The ground colour is pale smoky grey, and the large black spots are arranged much as in *Idea lynceus*. The female has the ground colour whiter and the wings more ample.

I. gaura, with its slow undulating flight, is in evidence on all the Malayan hill stations, but it occurs less frequently on the plains. It is essentially a forest insect, but, curiously enough, it is common at Batu

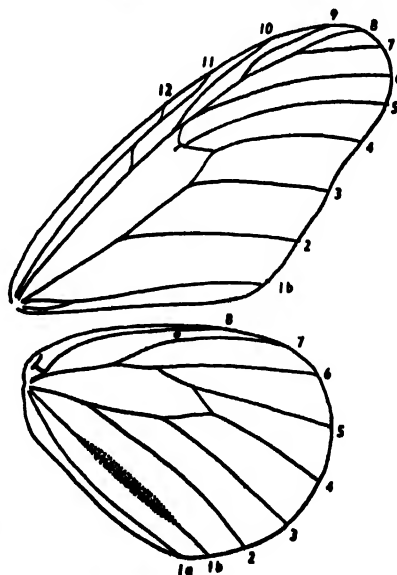


Fig. 39. *Ideopsis gaura* ♂. Venation.

Caves, in Selangor, which is a large outcrop of limestone, on which a few forest trees and shrubs still flourish, entirely surrounded by rubber plantations for many miles.

This butterfly appears to serve as a model for the day-flying *Zygaenid* moth mimic, *Cyclosia pieridoides virgo* Jordan.

The larva is velvety black, with milky white transverse stripes, and the two pairs of long, black, filamentous processes are reddened at the bases. The only recorded food plant is *Melodinus laevigatus* which does not grow in Malaya.

I. gaura is confined to Malaysia.

Genus *Idea* Fabricius

Resembles the previous genus, both structurally and superficially, but the male genitalia of *Idea* are far removed from those of *Danaus* and *Ideopsis*.

The brightly coloured larvae have four pairs of filamentous processes, and the pupae are suggestive of *Pieris brassicae* in general aspect although anally suspended.

The genus is represented from Ceylon and India, through the Archipelago to New Guinea, and, in many cases, the species give rise to remarkably distinct races.

(Basic literature: Moulton, 1921; Talbot, 1941.)

Key for the separation of the species of *IDEA*.

- | | | |
|---|--|------------------------|
| 1 | (4) Hindwing with three black spots in space 7. | |
| 2 | (3) Hindwing not produced at vein 5. Upperside smoky grey. | <i>I. lynceus</i> |
| 3 | Hindwing strongly produced at vein 5. Upperside whitish grey, with smaller spots than in <i>I. lynceus</i> . | <i>I. jasonia</i> |
| 4 | Hindwing with two black spots in space 7. | |
| 5 | (6) Upperside hindwing with detached black submarginal spots as in <i>I. lynceus</i> and <i>I. jasonia</i> . Upperside wing bases not yellow-tinted. | <i>I. hypermnestra</i> |
| 6 | Upperside hindwing with a black border bearing large white spots. Upperside wing bases yellow-tinted. | <i>I. leuconotus</i> |

Idea lynceus lynceus (Drury)

Plate 37, figure 63 ♂; genitalia, Plate 3, figure 30

The Tree Nymph

For many years there has been considerable doubt as to whether the forms grouped under *I. lynceus* comprised one species or two. A critical study of the male genitalia has demonstrated that Fruhstorfer was correct when he insisted that there were two species. Both inhabit primary forest at the usual elevations, and have similar habits, but, while *I. jasonia* (Genitalia, Plate 4, fig. 31) is distributed from Ceylon and south India to Assam, Burma and Malaya, *I. lynceus* is practically restricted to Neomalaya and Nias.

Both species have pale grey wings with black spots, and with the veins black dusted. In *I. lynceus*, the black spots are larger and the

wings more smoky in appearance ; the forewing termen is not so conspicuously excavated in the neighbourhood of veins 3 and 4, and the hindwing is not strongly produced at vein 5 as in *I. jasonia*. In Malaya, *I. jasonia logani* (Moore) is the commoner of the two.

The larva of *I. jasonia* is white, with broad black transverse bands, and with bright red lateral patches on the 2nd and 7th abdominal segments ; there are four long, black, paired filaments. The larva of *I. lynceus* is similar, but has a red dorsal spot on each of the first six abdominal segments and lacks the red lateral patches. The food plants recorded are *Agonosma cymosa* and *A. corymbosa*, which are not found in Malaya.

The two rarer species of *Idea* can be distinguished by the presence of two, instead of three, spots in space 7 on the hindwing. *I. hypermnestra linteata* (Butler) is marked much as in *I. lynceus*, but the wings are more rounded, the ground colour is whiter, and the large cell spot on the fore wing is very irregular. The species is confined to heavy forest at moderate elevations, and, although it has been found in the Langkawi Islands, it is rarely found north of Selangor. *I. leuconoe chersonesia* (Fruhstorfer) is a sea-shore species and frequents mangrove areas ; it is known also from Pulau Tioman. In this butterfly the marginal and submarginal spots are conjoined to form an irregular black band, and the wing bases are yellow-tinted (Genitalia, Plate 4, fig. 31a.)

The Malays call the *Idea* species *surat*, no doubt on account of the manner in which they float among the tree-tops as if at the mercy of the wind. When alarmed, however, these butterflies make off in a very capable fashion.

Genus *Euploea* Fabricius

Wings usually blackish brown, with a blue lustre, and termens slightly crenulate; forewing usually not produced, and vein 11 free. The forewing dorsum is curved or bowed in the male and straight in the female.

The male secondary sexual characters are of considerable importance; indeed, the genus has been divided into a number of subgenera on this basis, and, as the subgeneric names are extensively used in the literature, we append a summary of the subgeneric characters.

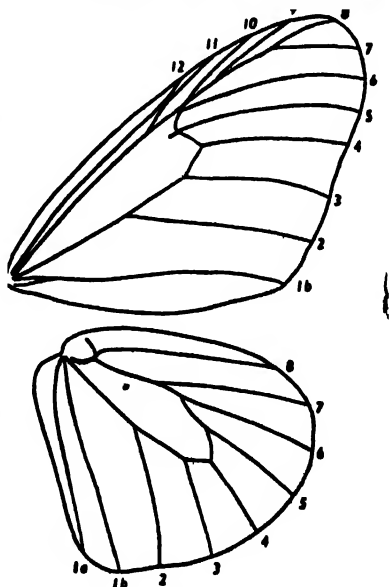


Fig. 40. *Euploea mulciber* ♂. Venation.

Summary of Subgenera in the genus *EUPLOEA*

(a) Forewing with a recurrent vein in the cell.

	♂ upH without a pale raised patch in the cell area.		♂ upH with a pale yellow raised patch in the cell area.	
	♂ upF without a brand in space 1b.	♂ upF with one brand in space 1b.	♂ upF with two brands in space 1b.	♂ upF without a brand in space 1b.
♂ upH without a speculum.			s.g. <i>Stictoploea</i> Butler <i>sylvester</i>	
♂ upH with a speculum.	s.g. <i>Adigama</i> Distant (= <i>Tronga</i> Dist., <i>Vonoma</i> Mre., <i>Menama</i> Mre.) <i>modesta</i> <i>crameri</i> <i>redtenbacheri</i>	s.g. <i>Crastia</i> Hubner (= <i>Penoa</i> Distant) <i>core</i> <i>algea</i> <i>doubledayi</i> <i>eyndhovii</i> (The last two species have the speculum blackened.)		s.g. <i>Trepsichrois</i> Hubner <i>mulciber</i>

(b) Forewing without a recurrent vein in the cell.

♂ upH with a pale yellow raised patch (white in <i>E. dioctetanus</i>) in the cell area	
♂ upF without a brand in space 1b.	♂ upF with one brand in space 1b.
s.g. <i>Calliploea</i> Butler <i>tulliolus</i> s.g. <i>Euploea</i> Fabricius <i>phaenarctia</i>	s.g. <i>Salpinx</i> Hubner (= <i>Isamia</i> Distant) <i>midamus</i> <i>klugii</i> <i>leucostictos</i> <i>dioctetanus</i>

Usually, the male *Euploea* has a pale nacreous area in the dorsal area on the underside of the forewing, and there is a corresponding smooth patch in the costal area on the hindwing above. In some groups there is a large oval and slightly shining speculum below the nacreous area on the hindwing. The speculum is paler than the the rest of the wing, and contains the androconial scales; in some groups (sub-genera *Trepsichrois*, *Calliploea*, *Euploea* and *Salpinx*) it has a prominent raised patch of pale yellow or white scales. In *E. doubledayi* and *E. eyndhovii* the speculum is blackened, and the remarkable androconial scales are long, filiform, wedge-shaped at one end, and fringed with hairs. In *E. mulciber* these scales are elongate with parallel edges, but, otherwise, the androconia

are uniform in structure throughout the genus, and show no specific differentiation. In space 1b on the forewing above may be one or two silky stripes composed of specialised scales; these brands are usually dark in colour, but are pale blue in *E. leucostictos* and *E. diocletianus*. On the underside of the forewing also, there may be a rather obscure elongate blackish brand in the pale area in space 1b; in some species there is a prominent thickened patch of blue scales below this brand.

Larvae with three or four pairs of filamentous processes, and, usually, with the colouring rather drab. Pupae rather rotund, brown or silvery, and with prominent brown stripes.

Widely distributed throughout the whole of the Indo-Australian Region with an extension to Mauritius and the Seychelles. The remarkable similarity between the representatives of the genus in the different subareas of the Indo-Australian Region is discussed on page 55.

(Basic literature: Moulton, 1921; Corbet, 1942b, 1943a; Talbot, 1943a.)

Key for the separation of the species of EUPLOEA.

- 1 (20) Forewing with a spur (the "recurrent vein") projecting into the cell from the middle discocellular vein. ♂ upperside hindwing without a pale raised patch of specialised scales in the cell area (except in *E. mulciber*).
- 2 (19) Upperside forewing apical half not bluer than the rest of the wing. Underside forewing postcellular spots in spaces 3, 4, 5 and 6 incomplete, except in *E. redtenbacheri* in which they form a regular arc.
- 3 (18) Upperside forewing not entirely deep lustrous blue. ♂ upperside forewing with no brand or only one.
- 4 (13) Hindwing with a double series of white, rounded, submarginal spots.
- 5 (6) Forewing longer than 50 mm. Upperside forewing with three series of white spots, in addition to single white spots in the cell and in space 10. Underside forewing with a complete series of postcellular spots in spaces 3, 4, 5 and 6. ♂ upperside forewing no brand. *E. redtenbacheri*
- 6 Forewing less than 50 mm. Upperside forewing with not more than two rows of white spots. Underside forewing postcellular series of spots in spaces 3, 4, 5 and 6 incomplete.
- 7 (10) Upperside forewing dark brown with dark blue gloss. Underside discal spots tinged with blue. Forewing excavate at end of vein 1b. No brand.
- 8 (9) Dark blue gloss strong. Forewing submarginal spots (where present) very small or minute, those in 2 and 3 the largest. *E. modesta modesta*
- 9 Blue gloss less strong, or very faint (♀). Forewing submarginal spots in 2, 3, 4 and 5 small, in 6, 7, and 8 much larger and blue-washed in ♂, white in ♀. *E. modesta tiamana*
- 10 Upperside dark brown without blue gloss.
- 11 (12) Upperside distally paler than basally. Forewing underside with cell-spot, spot in 10 and postdiscal spots in 2 and 3 rounded and roughly equal in size. ♂ Upperside forewing a short narrow brand in 1b. *E. cora*
- 12 Upperside very dark brown, hardly paler distally. Forewing underside cell spot, spot in 10 and postdiscal spots in 2 and 3 not all rounded or subequal; postdiscal spot sometimes present in 6 and 9. Underside discal and postdiscal spots faintly lilac; all others pure white. ♂ upperside forewing no brand. *E. crameri*

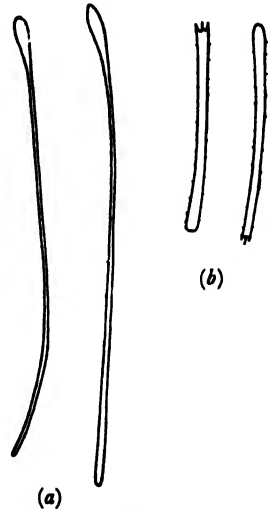


Fig. 41.
Androconial scales in
(a) *Euploea mulciber*
(b) *E. doubledayi*.

- 13 Hindwing submarginal spots prolonged to streaks.
- 14 (15) Hindwing submarginal streaks short, not more than 0.5 cm. ♂ upperside forewing brand very long and moderately broad, with the basal end extending to below the origin of vein 2. *E. algea*
- 15 Hindwing submarginal streaks much longer than 0.5 cm. ♂ upperside forewing brand long and narrower, but not extending to below the origin of vein 2. ♂ upperside hindwing speculum blackened and containing long, narrow, wedge-shaped, fringed, androconial scales.
- 16 (17) Forewing longer than 47 mm. ♀ upperside forewing with white discal spots. *E. doubledayi*
- 17 Forewing less than 47 mm. Upperside forewing paler and unmarked in both sexes. *E. cyndhovi*
- 18 Upperside forewing entirely deep lustrous blue. ♂ upperside forewing with two brands in space 1b. Hindwing with a double series of white rounded spots. *E. sylvester*
- 19 Upperside forewing apical half shining blue, with whitish spots. Underside forewing postcellular spot in space 4 out of line with spots in spaces 3, 5 and 6. ♂ upperside forewing no brand, but upperside hindwing with small, pale yellow, raised patch in the anterior portion of the cell; speculum with very long, club-shaped, fringed androconial scales. *E. mulciber*
- 20 Forewing without a spur projecting into the cell. ♂ upperside hindwing with a pale yellow, buff, or white raised patch in the cell area.
- 21 (30) Upperside forewing distal area of cell not whitened.
- 22 (23) Upperside forewing dorsal half of wing ferruginous brown, and apical half deep blue with bluish spots. ♂ upperside forewing no brand. Forewing less than 35 mm. *E. tulliolus*
- 23 Upperside forewing uniformly coloured. ♂ upperside forewing with a single brand (except in *E. phaenareta*).
- 24 (25) Forewing longer than 50 mm. Upperside forewing dark purple-brown in ♂, paler, more olive brown in ♀, and both wings with three series of violaceous spots. ♂ upperside forewing no brand. *E. phaenareta*
- 25 Forewing less than 50 mm. Upperside not so. ♂ upperside forewing with a single brand in space 1b.
- 26 (27) Underside hindwing with a spot at end cell. Upperside hindwing with a prominent double series of white submarginal spots. Upperside forewing basal two-thirds deep shining blue, with white submarginal spots obsolete in subsp. *rhoe*. In subsp. *singapura* the blue colour tends to obscurity and large and prominent white submarginal spots are present, as in *E. crameri*. ♂ upperside forewing brand long and narrow, with basal end almost extending to below the origin of vein 2. *E. midamus*
- 27 Underside hindwing with no cell spots. ♂ upperside forewing brand short and ovate.
- 28 (29) Upperside forewing with small whitish marginal spots and large, rather diffuse, pale violaceous subapical spots. Upperside hindwing with a double series of white submarginal spots. ♂ upperside forewing brand brown, and only slightly paler than the ground. *E. klugei*
- 29 Upperside forewing deep blue, with pale blue submarginal spots, marginal spots obsolete. Upperside hindwing without submarginal spots, or these spots very obscure if present. ♂ upperside forewing brand blue. *E. leucostictus*
- 30 Upperside forewing distal area of cell broadly whitened. ♂ upperside forewing brand blue, rather short and ovate. *E. diocletianus*

***Euploea redtenbacheri malayica* (Butler)**

Plate 36, figure 61 ♀

The Malayan Crow

Next to the rare *E. phaenareta*, *E. redtenbacheri* is the largest member of the genus. It is dark brown above, the forewing has a series of white discal, post-discal and marginal spots, and the species is unlikely to be confused with any other. The subspecies from the Langkawi Islands (subsp. *paraclaudina* Pendlebury) has a deep lustrous blue sheen on the upper surface.

The butterfly is not rare, and is taken singly in well wooded localities at all usual elevations throughout the Peninsula. The species occurs from Burma, through Malaysia, to Celebes and the Moluccas ; the rare Burmese race *camaralzaman* Butler is very different from the Malaysian forms, being deep shining blue above, with both wings almost unmarked except for the marginal and submarginal series of white spots on the hindwings.

The larva is velvety black with broad white transverse bands and an orange-brown lateral stripe ; the filaments are whitish. It feeds on *Strophanthus dichotomus*.

E. phaenareta castelnaui C. & R. Felder is paler and more purplish than *E. redtenbacheri*, and the similarly placed whitish spots, which are tinged violaceous, increase in size towards the forewing apex. The males of the two species are readily distinguished by the large, buff coloured, raised, scent patch in the cell on the hindwing above in *E. phaenareta*.

E. phaenareta is much rarer than *E. redtenbacheri*, and is confined to the coastal mangrove areas, and to lowland primary forest. It occurs from Ceylon and Burma, through Malaysia, to Australia and the Bismarck Archipelago. The yellow larva has the dorsal area densely chequered with pale brownish purple, while the lateral areas are marked with pale purple ; the spiracles are black, and the three pairs of filaments are tipped with yellowish white.

Euploea crameri bremeri C. & R. Felder

Plate 36, figure 58 ♂

The Spotted Black Crow

The wings are blackish brown above, and almost unmarked except for the marginal and submarginal series of white spots. The submarginal spots on the forewing comprise three rather small spots in spaces 2, 3 and 4, a large wedge-shaped spot in space 5, a similar spot nearly twice as long in space 6, and much smaller lenticular spots in spaces 7, 8 and 9. The male is without a brand on the forewing above and the female is paler.

E. crameri is not rare in secondary growth in the Langkawi Islands and on the east coast of the Peninsula, but elsewhere it is uncommon and seems to be rarer now than formerly. The species is confined to Burma and Malaysia.

A species which is confined to north Kedah as far as Malaya is concerned is *E. core wheeleri* Talbot. It is somewhat similar to *E. crameri* in general appearance, but is olive-brown above and, at least in the male, the white submarginal spots in spaces 2, 3 and 4 on the forewing are larger, and those in spaces 5 and 6 rather smaller. The male has a short, narrow black brand in space 1b on the forewing above.

The larva of *E. core* has been described as having a lilac tinge, with numerous dark brown transverse stripes, and a pale lateral stripe ; there are four pairs of purplish filaments. The greenish brown pupa is ornamented with golden lines. The food plants include *Cryptolepis pauciflora*, *Ficus indica* and *F. glomerata*, and we have bred the Burmese subspecies *godartii* Lucas from larvae found on *Nerium oleander*.

The distribution of *E. core* is curious ; the species is common in Ceylon, India and south-east China, and occurs through the Archipelago to New Guinea, Australia and the Bismarcks, but it appears to be absent from Borneo, the Moluccas, and some of the smaller islands.

***Euploea eyndhovii gardineri* Fruhstorfer**

Plate 36, figure 59 ♂

The Striped Black Crow

Above, the wings are velvety brown, the darker forewing is unspotted, and the hindwing has a series of whitish marginal spots, and a corresponding row of elongate, whitish, submarginal streaks. The male has a dark brand in space 1b on the forewing, and the hindwing speculum is broadly blackened, and contains curious elongate wedge-shaped androconial scales with the edges finely ciliated (fig. 41b). The female is paler than the male.

E. eyndhovii is widely distributed throughout the Peninsula at all usual elevations ; it prefers rather open forest country, and, although not uncommon, is never found in any abundance. The species is restricted to south Burma and Malaysia.

In the northern half of Malaya occurs a very similar species in which the male has the same genitalia and the same secondary sexual characters. This is *E. doubledayi evalida* (Swinhoe) which, however, is larger (forewing more than 47 mm.) and more imposing than *E. eyndhovii*, and the female has a few white spots on the upperside of the forewing. *E. doubledayi* flies in the same type of forest land as *E. eyndhovii*, but is much rarer.

E. doubledayi occurs from Sikkim through Assam and Burma to northern Malaya, and it is only in the narrow belt from south Burma to north Selangor that this species and *E. eyndhovii* fly together. There are several other pairs of duplex species found together in this narrow belt, and their origin has been discussed on pages 54, 55. Moulton (1921) reasonably, but incorrectly, considered *evalida* to be a montane race of Malayan *E. eyndhovii*.

E. alga menetriesii C. & R. Felder is very similar in appearance to *E. eyndhovii*, and has much the same distribution in the Peninsula. It can be separated, however, by the longer and broader forewing brand in the male, by the deep lustrous blue colour of the forewing in the female, and by the much shorter submarginal streaks on the hindwing in both sexes. In the male of *E. alga*, the hindwing speculum is not

blackened, as in *E. eyndhovii* and *E. doubledayi*, and lacks the elongate wedge-shaped androconial scales.

E. algea is widely distributed abroad, ranging from Sikkim to Malaysia and through the Archipelago to New Guinea, Australia and New Caledonia (fig. 10).

***Euploea mulciber mulciber* (Cramer)**

Plate 36, figure 57 ♂

The Striped Blue Crow

This is the commonest species of the genus in Malaya, and is found in wooded localities, and particularly along forest roads, at elevations up to 4,000 feet. Above, the male has the forewing shot with bright blue and ornamented with diffuse white spots in the distal half of the wing, and, when alarmed, it extrudes two yellow scent-pencils from the anal segment. The female is dark brown, with white diffuse spots in the blue-shot distal half of the forewing, but the hindwing has narrow white streaks arranged in the manner of *Danaus* species. The female is scarcer than the male, but both sexes are common in suitable localities.

The pale ochreous brown larva is marked with paler and darker transverse stripes, and has four pairs of black-tipped, carmine filaments ; it feeds on *Nerium* and has been found also on *Aristolochia* (fig. 37). The barrel-shaped pupa is entirely golden, and the duration of the pupal stage is seven days (fig. 38).

The species ranges from south India (where it is very rare), and south China, through Malaysia, to the Philippines and Celebes.

***Euploea tulliolus ledereri* (C. & R. Felder)**

Plate 36, figure 55 ♂

The Dwarf Crow

E. tulliolus is the smallest Malayan species of the genus, and is easily recognised by its size alone. The wings are a ferruginous brown, and the apical portion of the forewing is shot with deep blue and bears a few pale blue or whitish discal and submarginal spots. In the male the wings are very rounded, the forewing dorsum is strongly bowed, there is no brand on the forewing, but the hindwing has a raised patch of pale yellow or buff scent scales in the anterior portion of the cell. The hindwing is unmarked in the male, but the female has a submarginal series of small, diffuse, whitish spots.

The larva has been found in Java and is dark violet brown with faint pale and dark transverse stripes ; the dorsal stripe is yellowish white and the short filaments are violet brown. It feeds on *Malaisia scandens*.

The butterfly is commonest on forest roads at moderate elevations ;

it is generally distributed but rarer in the north. The species occurs from south Burma, throughout the Archipelago, to New Guinea, Australia, and the Pacific Islands.

***Euploea midamus chloe* (Guérin-Ménéville)**

Plate 36, figure 60 ♂; genitalia, Plate 4, figure 32.

The Blue Spotted Crow

At first sight, *E. midamus* may be confused with *E. algea* and *E. cyndhovi*, but closer examination reveals important differences. *E. midamus* is larger, the basal half of the forewing is glossed with blue, and the marginal and submarginal series of white spots on the hindwing are whiter and more clearly defined. These submarginal spots on the hindwing are not elongated to streaks as in the other species mentioned. In some individuals of *E. midamus chloe*, white subapical spots may be present on the forewing. The male has a narrow dark brand in space 1b on the forewing, and a pale yellowish scent patch in the cell area on the hindwing. *E. midamus* is very variable, and some varieties were regarded as distinct species by the older authors.

In the subspecies *singapura* (Moore), which occurs on Singapore Island and Pulau Tioman, the blue sheen is absent, and the forewing bears large and prominent white submarginal spots arranged much as in *E. crameri*.

The larva, which has been recorded from *Strophanthus* and *Nerium*, is orange or greenish orange, with black lateral spots, and the orange filaments are black tipped. *E. midamus* occurs on the forested plains throughout Malaya, but is nowhere common and is usually taken singly; occasionally, stray specimens are taken in the neighbourhood of villages. The species is distributed from Sikkim and south-east China through Malaysia to the Philippines.

Two rare species which may be mentioned here are *E. modesta* and *E. sylvester*. *E. modesta modesta* Butler is smaller than *E. midamus* or *E. crameri*; the basal two-thirds of the forewing is deep shining blue and unmarked, and the dark brown hindwing has marginal and submarginal series of rather quadrate white spots. The male has no brand on the upperside of the forewing. The species is not rare in Kedawi, but is very scarce in forest land at moderate elevations in Malaya proper. The very distinct subspecies *tiomana* Corbet, which occurs on Pulau Tioman, lacks the blue coloration (although the male is violet-washed), and has prominent white markings on the forewing much as in *E. crameri*.

E. sylvester harrisii C. & R. Felder (Plate 23) resembles *E. modesta*, but is a larger and more imposing butterfly, and is distinctive in that the male has two long dark brands in space 1b on the upperside of the forewing. It occurs throughout the Peninsula, and is least uncommon in Kedawi; abroad the species has a wide distribution, ranging from Ceylon and

India as far east as Australia, New Guinea and the Bismarcks. The larva has been found on *Ichnocarpus frutescens* in south India, where it is much attacked by parasites. It is pale bluish green, with yellowish transverse stripes and a yellowish dorsal line ; the pale yellow filaments are green-tipped.

***Euploea leucostictos leucogonis* (Butler)**

Plate 36, figure 62 ♂

The Blue-branded King Crow

This butterfly is suggestive of *E. tulliolus*, but is much larger. The forewing is blue-shot, with rather obscure violet-blue submarginal spots, and, in the male, there is a bluish brand in space 1b on the forewing. In the male also, there is a pale yellow patch of specialised scales in the cell area on the hindwing. The female is browner, and has a blue spot in space 1b on the forewing corresponding to the brand in the male. The insect occurs throughout Malaya in forested country, and prefers the hills to the plains. It is erratic in appearance ; it may be abundant in a locality for a few months and then disappear completely for a year or two before reappearing and becoming as common as before.

The black larva has four pairs of filaments of the same colour and of equal length and is ornamented with pale yellowish white transverse bands and blood-red lateral spots. It feeds on various species of *Ficus*.

E. leucostictos is distributed from Siam and Malaya, through the Archipelago, to the Fiji and Solomon Islands.

A closely related species which occurs in Ceylon and India, and is not found south of Kedawi, is *E. klugii erichsonii* C. & R. Felder (Genitalia, Plate 4, fig. 33). In this butterfly the wings are brown (distal halves paler), there is no blue sheen, and the diffuse whitish marginal and submarginal spots are lilac-washed. The male has the secondary sexual characters found in *E. leucostictos* and *E. midamus*, but the forewing brand is shorter. The purplish brown larva has a pure white lateral stripe which is edged with yellowish orange; the flesh-coloured filaments are tipped with black. The food plant is *Ficus hispida*.

***Euploea diocletianus diocletianus* (Fabricius)**

Plate 36, figure 56 ♂

The Magpie Crow

In the male the wings are a rich velvety bluish black, with a submarginal series of pale blue spots, a large white patch in the discal area on the forewing and a few long white streaks in the dorsal area of the hindwing ; there is a pale blue brand in space 1b on the forewing, and a patch of white scent scales in the cell area on the hindwing. The female is browner, and with more extensive white areas on both wings.

The male has a pair of yellow anal hair-pencils, which are extruded when the insect is handled or otherwise alarmed.

The males are exceedingly common throughout Malaya, frequenting forest roads, the banks of rocky streams, and quarries at all elevations. The comparatively rare female is found only in the forest, and favours higher altitudes than the male. The scarcity of the female is of some interest in relation to the subject of mimetic associations discussed on pages 47-52

E. diocletianus occurs from Sikkim to Malaysia and Celebes; it appears to be absent from the Philippines.

FAMILY SATYRIDAE

Browns and Arguses

The members of this family are usually medium-sized butterflies, with the wings short and broad, often with the termens scalloped, or dentate or caudate on the hindwing. The wings are dull brown, and usually ornamented with submarginal eye-spots. In many species the underside pattern is cryptic. As a rule the butterflies are weak in flight and frequent shady situations. Many of the Malayan species never leave the primeval forest, and a few of them are on the wing only at dawn and dusk. Usually, the butterflies are found among low herbage, and many species are very local.

The family characters are as follows: Eyes hairy in only a few genera. Palpi flattened laterally and densely hairy. Fore tarsi imperfect and brush-like in both sexes, and useless for walking. Body slender. Forewing with all veins present, and with the veins basally thickened or, more usually, with one or more veins swollen at the base. On the forewing vein 10 arises from the cell in all genera except *Ypthima* and *Ragadia*, and *M. orontis* is the single exception in *Mycalesis*. Hindwing with a precostal vein. Cells of both wings closed by tubular veins.

Secondary sexual characters are normally present in the males: usually, these consist of a glandular fold in the neighbourhood of vein 1b on the forewing above, and a patch of specialised scales in the subcostal area on the upperside of the hindwing, this latter patch having an overlying recumbent hair tuft. In the dorsal area on the underside of the forewing, there may be a small brand set in a nacreous area.

The male genitalia are simple in pattern, the uncus is long and tapering, and the valvae and aedeagus are not furnished with spines or hooks.

In countries in the monsoon areas certain Satyrid genera, notably *Mycalesis* and *Melanitis*, occur in dry- and wet-season forms, the former being characterised by the more angulate wings, the cryptic pattern of the underside, and the reduced submarginal ocelli. In Malaya proper, individuals of the dry-season form of *Mycalesis* occur as rare

aberrations, but they are more frequent in *Melanitis leda*. In Kedawi, however, the dry-season form appears as a standard type during the drier months from December to February.

Many of the species in the genus *Elymnias* closely resemble certain forms of *Danaus*, *Idea*, *Euploea* and even *Delias*. In the case of the Danaid genera there is little doubt that this resemblance is largely mimetic in character.



Fig. 42. *Elymnias hypermnestra*. Larva.



Fig. 43. *Elymnias hypermnestra*. Pupa.

The larvae of the Satyridae have the head bifid, often with a pair of long straight processes or horns, and the anal segment has a pair of posteriorly directed processes; the prothorax is constricted. The colour is green, yellow or brownish, and the markings consist of longitudinal lines; the body is pubescent. The food plants are almost entirely restricted to species of Gramineae and Palmaceae, and the larvae feed only at night.

The pupae are anally suspended, without tubercles, and with few prominent ridges.

Key to the Genera of SATYRIDAE

- 1 (20) Forewing with veins 3 and 4 separated at their origins (fig. 44). Underside with transverse stripes (except in *Neorina*, *Ethops* and in a few species of *Tiphina*), and prominent submarginal ocelli (except in *Ethops*).
- 2 (5) Eyes hairy.
- 3 (4) Forewing with all veins swollen at the base. Both wings with termens entire (fig. 45), although the hindwing is slightly crenulate in some species. Upperside forewing usually with a large ocellus in space 2. *Mycalesis*
- 4 Forewing with the veins basally thickened, but the subcostal is swollen in a few species. Hindwing crenulate and markedly caudate at vein 4 (slightly so in *L. verma*). Upperside forewing without an ocellus in space 2. *Lehis*
- 5 Eyes smooth (very slightly hairy in *Ragadia*).
- 6 (19) Tarsal claws on mid and hind legs not cleft.
- 7 (16) Forewing subcostal vein basally swollen (fig. 44). Forewing less than 32 mm.
- 8 (15) Hindwing cell not remarkably short, being as long, or nearly as long, as half the distance from the wing base to the termen (fig. 44). Wings not crossed by alternating light and dark bands.
- 9 (10) Forewing with vein 10 arising from vein 7 (fig. 44). Underside with dense striations. *Tiphina*
- 10 Forewing with vein 10 arising from the cell.
- 11 (12) Hindwing with veins 3 and 4 separate at their origins. Upperside hindwing with yellow-ringed black ocelli. *Brites*
- 12 Hindwing with veins 3 and 4 approximate at their origins. Upperside hindwing without yellow-ringed ocelli.
- 13 (14) Hindwing caudate at vein 4. Forewing falcate and produced at vein 6. Upperside hindwing normally partly coloured purple or blue. *Coelitis*
- 14 Both wings with termens entire. Forewing not falcate. Upperside uniform dull dark brown. *Orsotriana*
- 15 Hindwing cell very short, much less than half the distance from the base to the termen, and closed by oblique discocellulars, much thickened in ♂ (fig. 46), very slender in ♀. Wings crossed by alternating light and dark bands. *Ragadia*

- 16 Forewing veins thickened basally but not swollen (fig. 47). Forewing longer than 32 mm.
- 17 (18) Forewing falcate at vein 6, and the hindwing caudate at vein 4. Underside hindwing with ocelli in spaces 2 and 6. *Neorina*
- 18 Both wings with termens entire. Underside hindwing with white, ovate, post-discal spots. *Ethope*
- 19 Tarsal claws on the mid and hind legs cleft. Forewing falcate at vein 5, and the hindwing caudate at vein 4 (fig. 47). Upperside hindwing with a white dot or a white-pupilled ocellus in space 2. *Melanitis*
- 20 Forewing with veins 3 and 4 arising from a point at the end of the cell (fig. 48). Underside hindwing with fine striations, at least in the tornal area. *Elymnias*

Genus *Ypthima* Hübner

The adults are easily recognised by the striate underside, which bears a submarginal series of yellow-ringed black ocelli.

Antennal club very slight and gradual. Forewing with the subcostal and cubital* veins swollen at the base. Hindwing with veins 3 and 4 separated at their origins. Termens of both wings evenly rounded.

In some species (*Y. philomela*, *Y. baldus*, *Y. savara* and *Y. fasciata*), the male has a rather broad strip of greyish black specialised scales in the discal area of the forewing, but it is often difficult to detect this character in worn specimens. The males admit of ready identification from the form of the genitalia (see Plate 4, figs. 34–36).

The larvae are green, and the food plants comprise species of Gramineae. The genus is distributed in Africa and throughout the Indo-Australian Region.

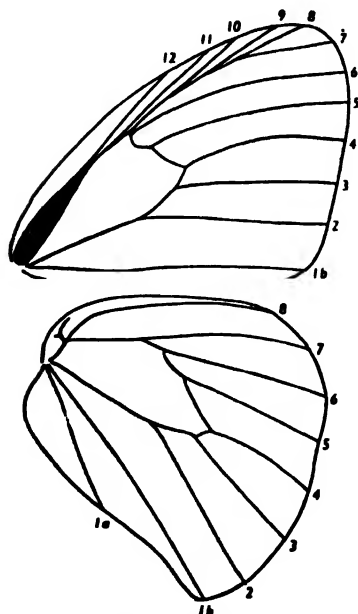


Fig. 44. *Ypthima savara* ♂. Venation.

Key for the separation of species of *YPHIMA*

- 1 (10) Underside hindwing with submarginal ocelli in spaces 1b, 2 and 3.
- 2 (9) Underside hindwing without an ocellus in space 4.
- 3 (4) Underside hindwing with an ocellus in space 6 and no ocellus in space 5; ocelli in spaces 1b, 2 and 3 in line.
- 4 Underside hindwing with an ocellus in space 6 and also an ocellus in space 5; ocellus in space 1b nearer the margin and not in line with those in spaces 2 and 3.

Y. ceylonica

- 5 (8) Forewing less than 19 mm. Underside hindwing ocellus in space 6 usually smaller than that in space 5.
- 6 (7) Underside with the wings not traversed by dark fasciae. *Y. philomela* (Plate 29, figure 7)
- 7 Underside wings traversed by rather shadowy, but quite obvious, dark fasciae. *Y. baldus*
- 8 Forewing longer than 19 mm. Underside hindwing ocelli in spaces 5 and 6 more or less equal, or that in space 6 rather larger. *Y. savara*

* The swelling at base of cubital vein is slight in comparison with that of the subcostal. It is not shown in the figure.

- 9 Underside hindwing with an ocellus in space 4, and the ocelli in spaces 2 to 6 subequal and forming a narrow band. Underside both wings traversed by two prominent dark fasciae. *Y. fasciata*
- 10 Underside hindwing without a submarginal ocellus in space 3, but with ocelli in spaces 1b, 2 and 6. *Y. pandocus*

***Ypthima pandocus corticaria* Butler**

Plate 37, figure 65 ♂

The Common Three-ring

This butterfly can almost dispute the claim of *Eurema hecabe* to be regarded as the commonest butterfly in Malaya, but, strangely enough, it does not occur north of Peninsular Siam, and it is not common on the islands off the coasts of the Malay Peninsula. On the mainland it is abundant at all altitudes, in the forest, in secondary growth, and even in town gardens.

The larva feeds on species of Gramineae, but, as far as we are aware, no observations have yet been published concerning the life history of the species.

Y. pandocus is one of the larger species of *Ypthima* found in Malaya. The upperside is greyish brown, with a large subapical ocellus on the forewing; the under surface is greyish or pale buff brown, with the wings traversed by innumerable fine dark brown striations, and, in addition to the large bipupilled subapical ocellus on the forewing, the hindwing has three yellow-ringed black submarginal ocelli. The butterfly is somewhat variable; and it occurs in a distinct form at about 5,500 feet on Gunung Tahan. This subspecies (*tahanensis* Pendlebury) has the underside of the hindwing darker and more distinctly banded than is usual in typical *corticaria*. *Y. pandocus* is distributed from Malaya to the Philippines and Celebes.

Of the smaller Malayan species of *Ypthima*, *Y. ceylonica hubneri* Kirby and *Y. baldus newboldi* Distant, with four and five ocelli respectively on the underside of the hindwing (if the two minute tornal spots enclosed in a single white ring be counted as a single ocellus), are widely distributed at low elevation in primary and secondary growth in Kedawi and Malaya proper.

Y. fasciata torone Fruhstorfer, with a submarginal series of seven small ocelli of nearly equal size on the underside of the hindwing, is the least abundant of the commoner species in Malaya. It is confined to primary forest at elevations up to about 3,000 feet. *Y. savara savara* Grose-Smith is a rare forest species of large size, and with five ocelli on the hindwing beneath.

Genus *Erites* Westwood

Forewing with the subcostal vein swollen at the base, and vein 5 recurrent into the cell for a distance of 2 or 3 mm. The hindwing is

crenulate in all species, and caudate at vein 4 in *E. angularis* and slightly so in *E. elegans*.

Distributed from Burma and Indo-China to Malaysia.

Key for the separation of species of *ERITES*

- | | | |
|---|---|---------------------|
| 1 | (2) Underside hindwing inner reddish brown band sharply angled. | <i>E. angularis</i> |
| 2 | Underside hindwing inner reddish brown band evenly curved. | |
| 3 | (4) Underside forewing submarginal ocellus in space 2 very large and prominent. | <i>E. argentina</i> |
| 4 | Underside forewing submarginal ocellus in space 2 not larger than the other submarginal ocelli. | <i>E. elegans</i> |

Erites angularis angularis Moore

Plate 37, figure 66 ♂

The Angled Cyclops

The upperside is dull greyish brown, with the two transverse reddish brown stripes and the yellow-ringed submarginal ocelli on the underside visible by transparency. On the underside, both the inner and outer reddish brown bands are sharply angled ; in the other Malayan species of *Erites* the inner band is evenly curved. The species is confined to dense lowland forest in Burma, Malaya and Sumatra.

Like *E. angularis*, *E. argentina delia* Martin has a large subternal spot on the forewing which is not present in *E. elegans distincta* Martin. The last named is the rarest of the Malayan species and is confined to Neomalaya ; *E. argentina* extends to Burma and the Large Sunda Islands.

Of none of the species of *Erites* is the life history known. The adults are feeble in flight, furtive in habit, and are most easily collected by the use of fruit bait. They are local in distribution, and usually a number may be taken at the same time.

Genus *Lethe* Hübner

Antennal club gradual, and thicker than usual among the Satyrids. Eyes densely hairy. The forewing is apically produced, except in *L. verma*, but only in this species and to a lesser extent in *L. confusa*, is the subcostal vein basally swollen. Sexes dissimilar.

In addition to the usual overlapping nacreous areas on the underside of the forewing and the upperside of the hindwing, the male of *L. minerva* has, on the forewing above, a large black area on the dorsum with a brown, oval, androconial patch on the middle of vein 1b, and, on the upperside of the hindwing, a dark androconial patch, overlaid with sparse hairs, in space 2. The male of *L. chandica* has an extensive black patch in the discal area on the forewing above. In other species (*L. vindhya*, *L. sinorix* and *L. mekara*), the discal portion of the forewing is clothed with specialised scales and overlaid with very fine hairs, but this character is obscure and may easily be missed.

Larva with the head and anal segment produced to a point; colour green, and food plant bamboo.

Distributed from Ceylon to palaearctic China, and through the Archipelago to Celebes and the Moluccas.

Key for the separation of the species of *LETHE*

- 1 (14) Hindwing with vein 3 arising from near the end of the cell. Hindwing caudate at vein 4.
- 2 (5) Underside forewing with a narrow white or whitish subbasal line. Underside ground colour more or less uniform brown or purple brown.
- 3 (4) Underside forewing ocellus in space 3 conjoined with the white or whitish post-discal band. Underside hindwing post-discal ocelli large, elongate and much disintegrated.
L. europa
- 4 Underside forewing ocellus in space 3 separated from the white or whitish post-discal band. Underside hindwing post-discal ocelli rounded and not disintegrated.
L. confusa
- 5 Underside forewing with a dark subbasal line which is, usually, outwardly shaded with whitish. Underside not uniformly coloured (except in *L. sinorix*).
- 6 (11) Underside hindwing post-discal ocelli disintegrated.
- 7 (10) Underside hindwing subbasal line straight.
- 8 (9) ♂ upperside forewing with a black band in the centre of the dorsum, ♀ upperside forewing with a white submarginal spot in space 1b.
L. minerva
- 9 ♂ upperside forewing without a band. ♀ upperside forewing without a white spot in space 1b.
L. mekara
- 10 Underside hindwing subbasal line irregular.
L. chandica
- 11 Underside hindwing post-discal ocelli not disintegrated.
- 12 (13) Underside with basal two-thirds purple-brown, and outer third buff brown. Upperside hindwing with a dark spot in space 4.
L. vinda
- 13 Underside uniformly coloured greyish brown. Upperside hindwing without a spot in space 4.
L. sinorix
- 14 Hindwing with vein 3 arising at least 1 mm. before the end of the cell. Hindwing crenulate but not caudate.
L. verma

Lethe europa malaya Corbet

Plate 37, figure 70 ♀; genitalia, Plate 4, figure 37

The Bamboo Tree-Brown

Above and below, this butterfly is coloured a deep chocolate-brown; the underside has a narrow white transverse subbasal line, and, on both wings, there is a series of interneural ocelli on a buff post-discal band. The female differs from the male in the possession of a broad white subapical band on the forewing.

The food plant of the larva is the bamboo commonly grown in villages and gardens, so the butterfly is to be found on the plains, and often near human habitations. It is most frequently taken in Malaya during the rainy-season months, and it is most active in flight at dawn and dusk. Occasionally, it is attracted by the lights of dwelling houses. It may be beaten out of bamboo hedges during the daytime, but it is never abundant.

The species is distributed from Formosa, China and India to the Philippines and the Lesser Sunda Islands.

The other Malayan species of *Lethe* are all rare forest butterflies. Both sexes of *L. confusa enima* Fruhstorfer suggest a small female of *L. europa*, but the two species can be readily separated as, on the underside of the forewing, the white subapical band is separated from the ocellus in space 3 in *L. confusa*.

Of the remaining species, *L. mekara gopaka* Fruhstorfer is the least uncommon, and is encountered occasionally feeding on animal excreta. It is a more ornate butterfly than *L. europa*, the underside being a rich greenish or purplish brown, with a dark narrow subbasal line which is outwardly shaded whitish, a dark shaded post-discal band, and the usual series of submarginal ocelli. On the hindwing above, the male has a series of large black submarginal spots on an orange-brown band, while the female is orange-brown above, with an irregular white subapical band on the forewing. *L. minerva minerva* Fabricius has a darker but similarly patterned underside, but is distinctive in the black dorsal area of specialised scales on the upperside of the forewing in the male, and in the more extensive white band on the forewing above in the female. *L. chandica namura* Fruhstorfer, which is much darker above and below in both sexes, also belongs to the *minerva* complex, but is commoner on the hills while the other two species are chiefly found on the plains.

The very rare montane species *L. vindhya luaba* Corbet and *L. sinorix vanda* Corbet have the hindwing tailed rather than toothed at vein 4, and, in the latter species, the large black submarginal spots on the upperside of the hindwing are placed on a diffuse ochreous brown band. *L. verma robinsoni* Pendlebury appears to be restricted to a small area on Cameron Highlands as far as the Peninsula is concerned. It is remarkable for the quadrate forewing, with a broad white subapical band in both sexes.

Genus *Neorina* Westwood

Antennae longer than usual, about half the length of the forewing, and the club very slight and gradual. Palpi with rather long hair on the dorsal edge. Hindwing with veins 3 and 4 approximate at their origins.

The butterflies are forest species, and the genus is represented from Sikkim through Malaysia to Java.

Neorina lowii neophyta Fruhstorfer

Plate 37, figure 64 ♂

The Malayan Owl

With the possible exception of *Elymnias kuenstleri*, this is the largest representative of the family Satyridae in the Malay Peninsula. It is dark blackish brown above, with a large white patch at the tornus of the forewing and the apex of the hindwing. There is a large subapical ocellus on the forewing, and a similar smaller spot in the tornal area of the hindwing. The underside resembles the upperside, but is paler and has an additional ocellus in the apical area of the hindwing.

The insect is not common, and the early stages are unknown. The butterfly is found in dense forest and is taken most frequently at about

500 feet, although it occurs at all usual elevations in the Malay Peninsula. The species has practically the same distribution as *Trogonoptera brookiana*, being found only in the Malay Peninsula, Sumatra, Borneo and Palawan.

It is a matter of considerable interest that a fossil butterfly discovered in oligocene deposits at Aix-en-Provence, France, closely resembles *N. lowii*. The relic has been named *Neorinopsis sepulta* Boisduval. It has been established that western Europe supported a Malay flora during part of the Tertiary, and there is little doubt that the climate was tropical.

Genus *Ethope* Moore

Antennae less than half the length of the forewing. *E. diademoides hislopi* Corbet is a very recent addition to the Malayan list, and cannot be mistaken for any other butterfly. The wings are dark brown, with short, narrow, white, submarginal stripes and a post-discal series of white spots, those on the forewing small, rather round, and decreasing towards the apex, and those on the hindwing large and ovate. The sexes are similar, but the female is usually paler and has more rounded wings.

E. diademoides is a forest species, known only from south Burma, Siam, Hainan and Kedah.

Genus *Coelites* Westwood

The upperside is dull purple or brown, and the underside silvery brown. Forewing with the subcostal vein swollen at the base and vein 5 recurrent into the cell for about 3 mm.

The male brand in *C. epiminthia* consists of an indigo-black oval patch, with an overlying pecten of recumbent hairs, near the distal end of vein 1b on the upperside of the hindwing. In *C. euptychioides* the male has a recumbent hair pecten directed inwards and lying along the distal side of vein 1b on the hindwing above (this pecten was not present in the only two Malayan males before us).

Life history unknown. Distributed from Burma to Malaysia and Celebes.

C. epiminthia epiminthia Westwood occurs in Kedawi and throughout the Peninsula while *C. euptychioides humilis* Butler is confined to Malaya proper. Both are lowland species, and found among the undergrowth in the darkest recesses of the forest.

Key for the separation of the species of COELITES

- 1 (2) Upperside with the deep bluish purple colour confined to the tornal area of the hindwing, and may be faint, or even obsolete, in ♀. *C. euptychioides*
- 2 Upperside with almost the whole of both wings purple. *C. epiminthia*

Genus *Mycalasis* Hübner

The butterflies of the *Mycalasis* group of genera are characterised by the evenly rounded wings, which are usually a drab shade of brown above, and, on the brighter under surface, have a pale post-discal band, and a series of submarginal ocelli on both wings.

The genus *Monotrichis* Hampson, with naked eyes, is confined to the African mainland. In Madagascar and tropical Africa is the extensive genus *Henotesia* Butler, which is closely allied to *Mycalesis* Hübner from the Indo-Australian Region (both with hairy eyes), but differs in that the lower discocellular between veins 4 and 5 on the forewing is straight and sharply angled anteriorly, and not strongly curved towards the base of the wing as in *Mycalesis*. The Malagasy *Henotesia narcissus* (F.) and the Malayan *Mycalesis anapita* have a general similarity of

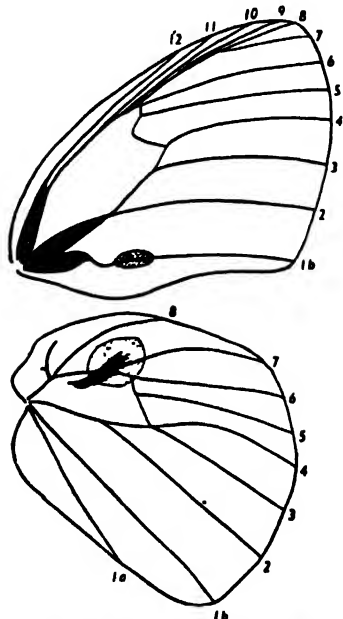


Fig. 45. *Mycalesis perseus* ♂. Venation.

facies, but they differ in male genitalia as well as in venation as stated above. On the hindwing in *Mycalesis*, veins 3 and 4 approximate at their origins.

In the male, the secondary sexual characters comprise a costal nacreous area on the upperside of the hindwing, which has a patch of specialised scales covered by a hair tuft (two separated tufts in *M. janardana*), and a dorsal nacreous area on the forewing beneath, which, usually, has a small dark patch of specialised scales on vein 1b. In *M. anaxias*, *M. anaxioides* and *M. maianeas*, there is, in addition, on the upperside of the forewing, a glandular fold lying along vein 1b and covered by a hair pencil; in *M. dohertyi* and *M. oroatis* there is, on the hindwing above, a fold enclosing a hair tuft in space 1b, which is near the base of the wing in the former species.

The males of *M. orseis* and *M. maianeas* have a black area of specialised scales on the upperside of the hindwing; this area is so extensive that it covers most of the wing in *M. maianeas*, but it is practically confined to spaces 2 and 3 in *M. orseis*. *M. janardana* has a black discal area of specialised scales on the forewing above.

The shape of the valvae may be of assistance in the identification of males in the *mineus* group, although too much reliance should not be placed on this character (see Plate 4, figs. 38–45).

While some of the species are very common and widely distributed, others are very rare and have a restricted range. In general, they are low-flying butterflies, preferring the shade of the forest undergrowth. Most of the species prefer the lowlands, but *M. anaxias* is confined to the hills.

In countries with wet and dry seasons, most species of *Mycalesis*

exhibit seasonal dimorphism, the dry-season form being distinctive in the paler and more cryptically coloured underside and the greatly reduced submarginal ocelli. In Malaya proper the dry-season form occurs very rarely as an aberration in species of the *mineus* group, but, during the drier months in Kedawi (December to February), "dry" individuals appear regularly among the species of this group.

The larvae are not distinctive and feed on grasses, padi and bamboo. (Basic literature: Talbot and Corbet, 1939).

Key for the separation of the species of MYCALESIS

- 1 (30) Forewing vein 10 arising at or before the end of the cell.
- 2 (7) Underside with two straight reddish brown lines across both wings.
- 3 (4) Upperside and underside deep orange. Upperside forewing with a black apical border. *M. anapita*
- 4 Upperside some shade of brown.
- 5 (6) Upperside forewing with a very large, white-pupilled, black ocellus, prominently orange-ringed, in space 2. *M. mnasicles*
- 6 Upperside forewing with the ocellus in space 2 rather obscure and of the usual size. *M. fuscum*
- 7 Underside not so marked.
- 8 (27) Upperside forewing without a white subapical band.
- 9 (26) Underside with one or two pale straight lines or bands internal to the submarginal ocelli.
- 10 (25) Underside with a single straight white or whitish line running from the forewing costa to near the hindwing tornus.
- 11 (12) Underside submarginal ocelli in spaces 1b and 2 on the forewing and in spaces 2 to 6 on hindwing more or less equal in size. *M. janardana*
- 12 Underside submarginal ocellus in space 2 on the forewing, and usually in space 2 on hindwing also, larger than the other ocelli on these wings.
- 13 (24) Underside forewing without a complete series of ocelli in spaces 3 to 6. ♂ upperside dark brown, ♀ paler (*mineus* group).
- 14 (19) Underside hindwing with the thin white (or pale buff) line inwardly bounding the ocelli in spaces 4 and 5 deeply indented (*M. persus* and *M. mineus*) or angled (*M. intermedia*).
- 15 (16) Underside hindwing ocellus in space 2 moved in, and quite out of line with the ocelli in spaces 1b and 3. ♂ upperside hindwing brand short, oval and dark brown. ♂ underside forewing brand very small, narrow and dark brown, and centrally placed under the origin of vein 2. *M. persus*
- 16 Underside hindwing ocellus in space 2 in line with the ocelli in spaces 1b and 3.
- 17 (18) Upperside forewing with the large ocellus in space 2 with the yellow ring dull and diffuse in both sexes, but more prominent in ♀. Upperside hindwing no ocellus. ♂ underside forewing brand usually small, narrow and dark brown, and centrally placed under the origin of vein 2; upperside hindwing brand salmon-pink in some lights. *M. minus*
- 18 Upperside forewing with the large ocellus in space 2, with white central dot, larger than in *M. minus*, and the yellow ring uniform and clearly defined. ♀ upperside hindwing usually with an ocellus in space 2. ♂ underside forewing brand long, oval and dark brown, with the centre beyond the origin of vein 2; upperside hindwing brand large, oval and pale yellow. *M. intermedia*
- 19 Underside hindwing with the thin white (or pale buff) lines inwardly bounding the submarginal ocelli in spaces 4 and 5 evenly curved and not deeply indented.
- 20 (21) Underside hindwing ocellus in space 2 moved in slightly but definitely. ♂ underside forewing brand long, oval and pale yellow, reaching the white post-discal band, which is bent outwards; upperside hindwing brand pale yellow. *M. visala*
- 21 Underside hindwing ocelli in spaces 1b, 2 and 3 in a straight line.
- 22 (23) Upperside forewing ocellus in space 2 large and prominently ringed deep yellow. Upperside hindwing ocellus in space 2 in ♀ only. ♂ underside forewing brand rather large, oval and ferruginous brown, with the centre beyond the origin of vein 2; upperside hindwing brand long, narrow and dark brown. *M. persoides*
- 23 Upperside forewing ocellus in space 2 with the yellow ring narrow and obscure in ♂, clearly defined in ♀. Upperside hindwing with a single obscure ocellus in ♂, usually with two ocelli in ♀. ♂ underside forewing brand long, oval and brown, and centrally placed under the origin of vein 2; upperside hindwing brand extended outwardly to form a second pale yellow, wedge-shaped brand below vein 7. *M. horzfeldi*

- 24 Underside forewing with a complete series of equal submarginal ocelli in spaces 3 to 6.
♂ upperside dark purple-brown; ♀ pale brown. *M. orseis*
- 25 Underside with two ochreous buff bands, outwardly diffuse and crossing both wings.
M. doheri
- 26 Underside wings not crossed by pale straight lines or bands, but by obscure irregular
paler markings. *M. maianae*
- 27 Upperside forewing with a white subapical band.
- 28 (29) Upperside forewing without a white-pupilled ocellus in space 2. ♂ upperside hindwing
without a black patch at the base of space 6. *M. anaxias*
- 29 Upperside forewing with an obscure, white-pupilled ocellus in space 2. ♂ upperside
hindwing with a black patch at the base of space 6. *M. anaxioides*
- 30 Forewing with vein 10 arising from vein 7 well beyond the cell-end. Upperside
reddish brown with black bordering. Underside crossed by a single, lilac-washed,
white line. *M. orontis*

***Mycalesis janardana sagittigera* Fruhstorfer**

Plate 37, figure 67 ♂

The Common Bush Brown

There should be little difficulty in recognising *M. janardana*; the underside is pale greyish brown, uniformly stippled, and with the white post-discal stripe narrow and dull. The submarginal ocelli in spaces 1b to 6 on both wings are much more uniform in size than usual, those in space 2 on both wings being only slightly larger than their neighbours. The male of *M. janardana* is remarkable in that there are two separated hair tufts on the brand in the costal area of the hindwing above.

The butterfly is fairly common in undergrowth in primary and secondary forest at moderate elevations. It appears to be a common insect on Pulau Tioman.

Nothing is known concerning its life history. It does not occur as far north as Burma, but extends eastwards to Celebes and the Moluccas.

***Mycalesis mineus macromalayana* Fruhstorfer**

Plate 29, figure 8. Plate 37, figure 68 ♀

The Dark Brand Bush Brown

This, the commonest Malayan species of the genus, is a drab-looking butterfly, with the upperside dark greyish brown, and with a somewhat obscure ocellus in space 2 on the forewing. The underside is paler, the post-discal stripe is narrow but clear white, and the submarginal ocelli are not complete on the forewing, usually comprising a large ocellus in space 2 and a smaller one in space 5. Unlike *M. janardana*, the male of *M. mineus* has a single pale yellow hair tuft overlying the brand in the costal area of the upperside of the hindwing.

M. mineus is found throughout the lowlands of Malaya, and a similar but less abundant species is *M. perseus cepheus* Butler. In the former, the ocelli in spaces 1b, 2 and 3 on the underside of the hindwing have their centres in line, but, in the latter, the ocellus in space 2 is moved inwards.

A third species, *M. visala phamis* Talbot & Corbet, which has the ocellus in space 2 moved in slightly but definitely, can be separated from its congeners mentioned above in that the narrow white line which inwardly bounds the submarginal ocelli on the hindwing is evenly curved in spaces 4 and 5 and not deeply indented. *M. visala* is now quite common in the lowland forests of the Peninsula, which represents its most southern extension, but no specimens are known from Malaya earlier than 1915.

Of the other species in the *mineus* group, *M. perseoides perseoides* (Moore) and *M. intermedia intermedia* (Moore) are practically confined to Kedawi as far as Malaya is concerned, while *M. horsfieldi hermana* Fruhstorfer is very rare in Malaya proper, less so in the Langkawi Islands, and fairly common on Pulau Tioman.

The larva of *M. mineus* is pale green at first, and then changes to a smoky yellow ; it rests near the roots of the food plant during the day and feeds only at night. The green pupa is suspended from the underside of a blade of grass, and the pupal stage occupies nine or ten days. The species is distributed from Ceylon to Indo-China, and through the Malay Archipelago to New Guinea and Australia.

Although not closely related to the *mineus* group, *M. orseis nautilus* Butler bears a superficial resemblance. Usually, more than one ocellus is visible on the forewing above, and, in some lights, the forewing has a purplish reflection. The rather broad white post-discal line on the underside is faintly violet-washed, and is outwardly diffuse; the prominently yellow-ringed submarginal ocelli are rather uniform in size, and are almost all present in the female and are mostly so in the male. The latter sex can be separated from all other Malayan species of *Mycalesis* by the dark androconial patch in spaces 2 and 3 on the upperside of the hindwing. Found in Malaya in primary forest at all usual elevations.

Mycalesis fuscum fuscum (C. & R. Felder)

Plate 37, figure 69, ♀

The Malayan Bush Brown

This species is quite distinct from its congeners on the underside, which is ochreous brown and crossed by two reddish brown longitudinal stripes; the submarginal spots are small, and are not ringed with white. The female is larger, with more rounded forewings, and has the under surface distinctly paler in colour.

The butterfly is not uncommon in wooded localities at moderate elevations, and the female is taken less frequently than the male. The species is practically confined to Malaysia.

Mycalesis anaxias bisaltia* FruhstorferPlate 37, figure 71, ♂***The White-bar Bush Brown**

Above and below, the forewing has a white subapical band, and, on the underside, the basal two-thirds of both wings are coloured dark chocolate-brown; there is no pale post-discal band, and the submarginal spotting in the violaceous-washed buff distal margin is less pronounced than in other species of the genus.

M. anaxias is found only on forest-clad hills at elevations of about 2500–3500 feet. Usually, it is the commonest member of the genus on hill stations, and is on the wing on dull as well as sunny days. It is more alert than the *Mycalesis* species of the plains.

The species has a restricted range, being confined to India, Indo-China and the Malay Peninsula.

Another northern species found in the Malayan hills and which suggests a large edition of *M. anaxias* is *M. anaxioides* Marshall. The two can be separated without difficulty as the latter species has an obscure ocellus in space 2 on the upperside of the hindwing.

Of the rarer species *M. anapila anapila* Moore is a rich ochreous red on both wing surfaces, and the underside is traversed by two straight reddish-brown lines. It is a very local forest butterfly found at moderate elevations. *M. mnasicles perna* Fruhstorfer is the largest Malayan species and easily recognised by the very large, white-centred ocellus in the subternal area of the forewing above. *M. maianeas maianeas* Hewitson is dark brown above, with the subapical area of the forewing paler in the male, and with a diffuse orange band in the female; the underside is deep purple-brown, with the apical area of the forewing orange, and with irregular and obscure transverse markings on both wings. The male is remarkable for the extensive black androconial area covering most of the hindwing. *M. oroatis ustulata* Distant has the upperside reddish brown, and the underside is dark brown, with a narrow purplish-white transverse post-discal stripe. It differs from all other Malayan *Mycalesis* in that vein 10 originates from vein 7 and not from the cell. These species are found only in heavy forest and are never common. *M. maianeas* and *M. oroatis* occur in greatest numbers following the autumnal equinox which signifies the beginning of the wet season.

Genus *Orsotriasa* Wallengren

The adults resemble those of *Mycalesis*, but differ in that the eyes are smooth, and only the subcostal vein is swollen at the base.

In the male there is an elongate fold enclosing a hair pencil in space 1b on the upperside of the forewing, and, on the hindwing above in the bases of space 1b and the cell is an area of specialised scales covered by a pair of recumbent hair pencils.

The genus is represented from Ceylon through the Archipelago to Australia and the South Seas.

***Orsotriacna medus cinerea* (Butler)**

Plate 37, figure 72, ♂

The Nigger

This butterfly is dark brown above and unmarked; on the underside, a prominent clear white stripe extends from the costa on the forewing to the tornus on the hindwing. The forewing has two, and the hindwing three, submarginal ocelli. At first glance, the butterfly might be taken for a species of *Mycalesis*, but there are certain marked differences which will be evident from the figure.

The larva feeds on grasses (including *Oryza sativa*), and the butterfly is very common on the plains among grass growing under shade.

The insect occurs throughout Malaya, and is known also from Pulau Tioman. Outside Malaya, it is distributed from India to New Guinea and Australia.

Genus *Ragadia* Westwood

Forewing with the subcostal veins swollen at the base. Hindwing with veins 3 and 4 stalked at a point well beyond the end of the cell. Termens entire. In the male, the discocellulars on the hindwing are inflated and a cavity alongside them on the upperside encloses a hair tuft.

Distributed from India and west China through Malaysia to the Philippines.

Key for the separation of the species of *RAGADIA*

- 1 (2) Upperside with a prominent white band running from near the apex of the forewing to the inner margin of the hindwing. *R. crisilda*
- 2 Upperside without a white band, although the pale transverse stripes on the underside may be visible by transparency. *R. makuta*

***Ragadia makuta siponta* Fruhstorfer**

Plate 37, figure 73, ♂

The Striped Ringlet

The underside is a dirty white and the wings are traversed by four rather narrow chocolate-brown stripes, and there is a complete

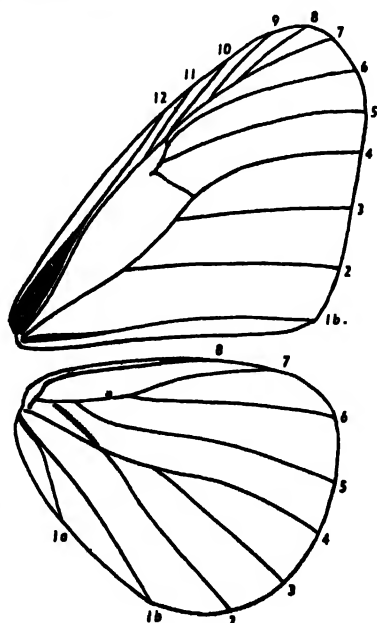


Fig. 46. *Ragadia crisilda* ♂. Venation.

series of submarginal ocelli. The butterfly is pale brown above with the whitish bands from the underside visible.

The insect occurs in primary forest in Malaya at all usual elevations, but it is most abundant on the plains. It is found among undergrowth in well wooded localities, and has a feeble, fluttering flight. The species is confined to Malaysia.

Another species, *R. crisilda critolina* Evans, seems to be very local, and has been found hitherto only on Cameron Highlands and Fraser's Hill at elevations of 4000 to 5000 feet. It is rendered distinctive by the blackish-brown upperside being traversed by a white median band, with a second white submarginal band on the hindwing; the underside has alternate dark brown and white stripes, and the usual submarginal ocelli are present. The species deserves the name of The Zebra Ringlet. It is not found south of the Malay Peninsula.

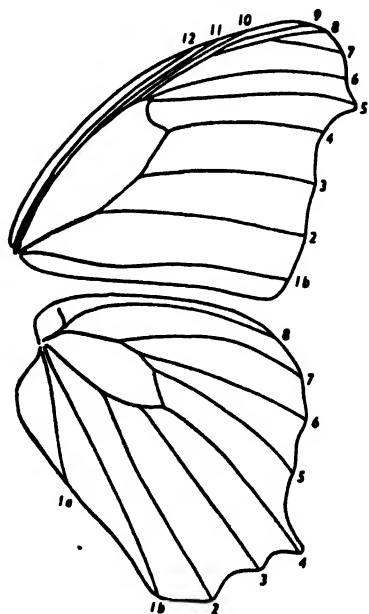


Fig. 47. *Melanitis leda* ♀. Venation.

Genus *Melanitis* Fabricius

On the hindwing, veins 3 and 4 are separated at their origins. The wing shape is characteristic of the genus, and the female has more falcate wings than the male.

During the winter months in Kedawi, *M. leda* occurs in its dry-season form, with more angulate wings and a leaf-like underside with much reduced submarginal ocelli.

The genus occurs in Africa, and from Ceylon through the Malay regions to Australia.

Key for the separation of the species of *MELANITIS*

- 1 (2) Upperside rather pale brown, with a slight ochreous hue; forewing with a rather diffuse, white-pupilled, black spot in space 3, and with an elongate white spot, inwardly edged with black, above it in space 4; the black spots are inwardly edged with orange. *M. leda*

2 Upperside forewing not so marked.

- 3 (4) Upperside deep reddish brown; forewing with a diffuse, orange, subapical patch, a black diffuse spot in space 3, and a sullied white spot above it in space 4. *M. zitenius*

- 4 Upperside blackish brown in ♂, pale brown in ♀, with the apical area paler in both sexes; forewing unmarked in ♂ and with an obscure black spot, bearing a diffuse white dot, in space 4 in ♀. *M. phedima*

Melanitis leda leda (Linnaeus)

Plate 38, figure 74, ♀; genitalia, Plate 4, figure 46

The Common Evening Brown

This species has a very wide geographical range, extending from tropical Africa to Australia and the Bismarck Archipelago. The larva feeds on rice, and the butterfly is usually common where padi is cultivated.

The butterfly is very variable. The upperside is dark brown, with a black subapical patch bearing two white spots and inwardly shaded with orange brown. The very variable underside is buff or grey, with fine dark brown transverse striations; a submarginal series of white-centred, yellow-ringed, black ocelli on both wings may be prominent or almost obsolete. In parts of India and Burma, where the dry and wet seasons are clearly differentiated, the form with the prominent ocelli on the underside occurs during the rainy season, while the dry-season form is much more lightly marked. In Malaya proper, where there are no marked seasons, both forms occur together with all intergrades. In Kedawi, however, the dry-season form is of more constant occurrence during the drier months from December to February.

It seems probable that the larva feeds on bamboo in addition to padi, for the butterflies are often common in gardens in Malaya with bamboo hedges. Usually, the butterflies fly only at dawn and shortly before dusk. The insect is widely distributed, but is largely confined to the plains.

Both the other Malayan species of *Melanitis* are confined to the forest, although found at all usual elevations. *M. zitenius auletes* Fruhstorfer is larger than *M. leda*, with the upperside reddish brown, and the forewing has a black subapical patch bearing a single white spot, and a diffuse, dull orange, subapical band.

M. phedima abdullae Distant is a smaller and more drab-looking butterfly; the male is blackish brown and unmarked, and the female is paler brown with an obscure black subapical patch on the upperside of the forewing. Both these last two species are uncommon, and, while *M. phedima* prefers the plains, *M. zitenius* is more often found at elevations of 1800 to 3500 feet.

Genus Elymnias Hübner

The adults are very characteristic in appearance, although, structurally, they are not sharply separated from the rest of the Satyridae. They are of rather large size, with the antennal club long and gradual. Eyes smooth. Forewing with the subcostal vein swollen at the base. Hindwing with a prediscoidal cell, which is visible on the upperside, through the forewing, by the use of benzene. Both terms scalloped, and, in some species, the forewing toothed at veins 3 and 5 and the

hindwing at vein 4. In most species the costal edge of the forewing above is faintly chequered.

The male secondary sexual characters comprise a nacreous area along the dorsum on the underside of the forewing, and a corresponding similar area in the costal region on the upperside of the hindwing. In the anterior part of the cell on the hindwing above is a dark oval brand, with a single overlying hair tuft in *E. panthera*, *E. dara*, *E. patna* and *E. esaca*, and with two such tufts in the other Malayan species. *E. hypermnestra* has, in addition, an obscure black androconial patch near the base of space 1b on the forewing above, and *E. esaca* has an androconial cavity with an erectile hair tuft along vein 1b on the same wing surface. In most *Elymnias* species the sexes are dissimilar.

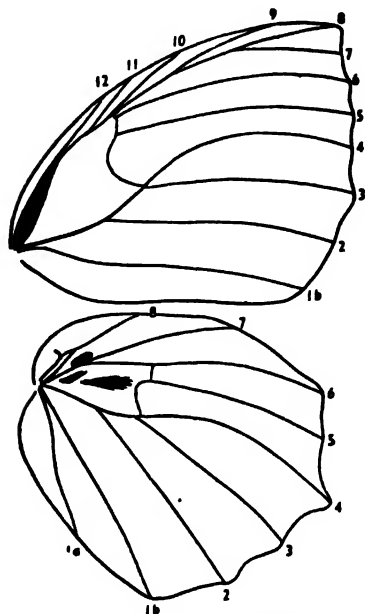


Fig. 48. *Elymnias hypermnestra* ♂.
Venation.

The *Elymnias* are mostly forest dwellers, preferring the shade to the sunshine, and are inclined to be crepuscular in habit. They are of great biological interest on account of their mimetic associations.

The larvae, which are of the usual Satyrid type, are *Calamus* (rotang) feeders.

The genus is distributed from Ceylon to New Guinea and the Bismarck Archipelago, and, in the Papuan area, many of the species closely resemble *Tenaris* forms. An allied genus *Elymniopsis* Fruhstorfer, occurs in tropical Africa.

In a book devoted to Malayan butterflies, mention should be made of the generic name *Bruasa* Moore (genotype *E. penanga*), which commemorates the ancient Malay Kingdom of Bruas, in Perak: unfortunately, the name falls as a synonym of *Elymnias*.

(Basic literature: Corbet, 1933, 1937b, 1943b.)

Key for the separation of the species of ELYMNIAS

- 1 (24) ♂ upperside forewing without a brand. ♀ underside hindwing base not reddened.
- 2 (23) Forewing and hindwing with termens scalloped.
- 3 (4) Both wings with a broad white post-discal band. *E. dara*
- 4 Hindwing without a white band.
- 5 (8) Upperside hindwing with a prominent, pale buff (*E. panthera*) border, or pale greenish (*E. harterii*), with blackish interneural spots. Hindwing tailed at vein 4.
- 6 (7) Upperside forewing dark brown with termen ferruginous. *E. panthera*
- 7 Upperside forewing black, with obscure greenish subapical fascia. *E. harterii*

- 8 Upperside hindwing not so marked.
- 9 (10) Wings pale greyish white, with diffuse black markings arranged as in *Idea*.
E. kumstleri ♀
- 10 Wings not greyish white.
- 11 (14) Underside forewing without the usual *Elymnias* striations.
- 12 (13) Upperside forewing with prominent white or whitish post-discal spots, of which that in space 2 is moved inwards and out of line with the spots in spaces 1b and 3; only the apical area blue-streaked. Upperside hindwing with clear white, submarginal spots.
E. kumstleri ♂
- 13 Upperside forewing with the white spots, which may be minute or obscure, in spaces 1b, 2 and 3 in line; distal half with pale blue streaks. Upperside hindwing with white submarginal spots above vein 4 tinged with blue.
E. patna
- 14 Underside forewing with the usual *Elymnias* striations.
- 15 (16) Upperside forewing orange, and with a white subapical band.
E. hypermnestra ♀ (Kedawi race)
- 16 Upperside forewing not orange.
- 17 (22) Upperside forewing marked with pale blue spots, or pale blue or greenish grey stripes.
- 18 (19) Upperside forewing black or dark brown, with blue or bluish submarginal spots; no spot near the base of space 3.
E. hypermnestra
- 19 Upperside forewing not as above.
- 20 (21) ♂ upperside pale greenish grey, with the veins heavily blackened. ♀ upperside rather similar, but the stripes are greyish white, dusted with pale purplish blue in the apical half and pale ferruginous in the basal half of the forewing; upperside forewing subapical stripes continuous.
E. nesaea
- 21 ♂ upperside forewing distal half deep lustrous blue, with pale blue submarginal spots, and a similar spot near the base of space 3. ♀ upperside as in *E. nesaea* ♀, but the pale stripes in the apical half of the forewing are broken; e.g. the spot beyond the cell-end is not conjoined with the streak in space 4.
E. casiphona
- 22 Upperside forewing dark reddish brown, unmarked in ♂, and with a few obscure sub-tornal spots in ♀. Upperside hindwing with pale buff interneural streaks.
E. kamara
- 23 Hindwing termen not scalloped, and forewing termen only slightly so. ♂ upperside forewing deep lustrous blue, with paler blue post-discal streaks. ♀ upperside greenish black, and with a white subapical band on the forewing in form *penanga*.
E. penanga
- 24 ♂ upperside forewing with a band along the middle of vein 1b, covered with a recumbent hair tuft. ♀ underside hindwing with base reddened. ♂ upperside black, with pale blue marginal fascia on both wings. ♀ upperside white, with veins heavily black dusted; *Delias*-like.
E. esaca

Elymnias hypermnestra beatrice Fruhstorfer

Plate 38, figure 75, ♂; genitalia, Plate 4, figure 47

The Common Palmfly

This species is the commonest and most widespread representative of one of the most interesting genera of butterflies in the Indo-Australian Region. All the *Elymnias* species are rather large and delicate, usually of rather sombre coloration, and many are extremely rare.

On the upperside, *E. hypermnestra* is bluish black with a series of blue submarginal spots on the forewing; the underside is a rich irrorated brown, with a "thumb-print" of a lighter shade at the apex of the forewing, and a prominent white spot in the centre of the costa on the hindwing. In general, in the races from Malaya proper and Pulau Tioman, the female resembles the male, but is somewhat lighter in colour and has a few whitish submarginal spots on the hindwing above.

In Kedawi, *E. hypermnestra* is represented by the subspecies *tinctoria* Moore, in which the female (plate 38, figure 76) resembles *Danaus genutia* above, although the males of the two races are practically

indistinguishable. The subspecies *discrepans* Distant, occurring in Province Wellesley and Penang, has a very variable female which is intermediate in appearance between *tinctoria* and *beatrice*. The subspecies *agina* Fruhstorfer, from Johore and Singapore, has the female larger than in *beatrice*, and with whiter submarginal spots on the forewing; the Tioman race *nimota* Corbet has both sexes larger than in *agina*, and the male has the blue spotting on the forewing somewhat reduced.

The larva of *E. hypermnestra* is green, with yellow longitudinal stripes, and the head and anal processes are pink (fig. 42). The pupa is green with longitudinal stripes (fig. 43). The larva feeds on the coconut

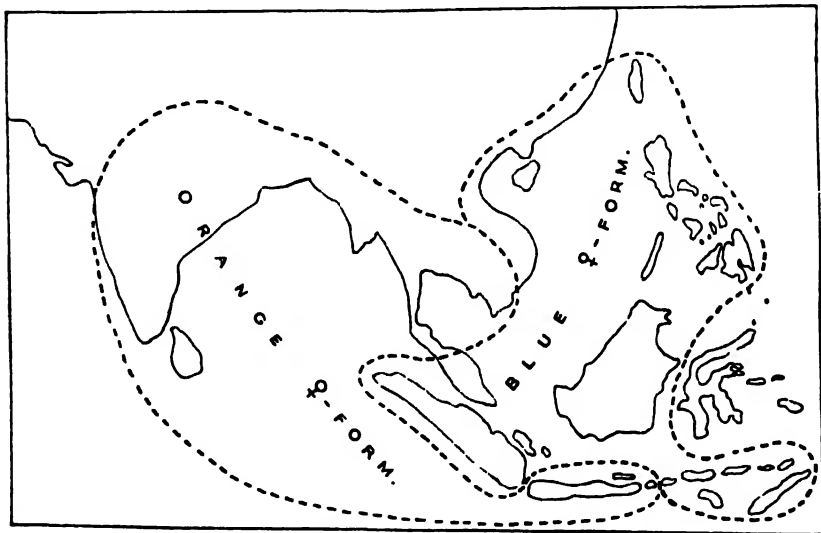


Fig. 49. Distribution of the female forms of *Elymnias hypermnestra*.

In Java and in the western part of its range, the female of *Elymnias hypermnestra* resembles the *Danaid* species *Danaus genutia* and *D. melanippus* in appearance and flight. In eastern China, Malaysia, the Philippines and Lesser Sunda Islands, the female resembles the male. Intermediates occur in northern Malaya where the two forms meet.

palm, and is usually common where the food plant occurs. It is believed that bamboo is another larval food, and, in the forest, it is probable that other species of Palmaceae are favoured.

The butterfly is fond of shade, and, in Malaya proper, is not often found flying in bright sunshine. In the Langkawi Islands and north Kedah, however, the female may be seen in flight in the hottest part of the day in open country of the type favoured by *Danaus genutia*.

E. hypermnestra occurs from Ceylon and India to Formosa and Indo-China, and through Malaysia to the Lesser Sunda Islands and the Philippines. The form with the female resembling *Danaus genutia* is

found in Ceylon and India and from Burma to Kedawi, and reappears again in Java and Bali. In Formosa, Indo-China, Neomalaya, the Lesser Sundas and the Philippines, the female resembles the male.

***Elymnias panthera panthera* (Fabricius)**

Plate 38, figure 77, ♀

The Tawny Palmfly

This butterfly is confined to Malaysia, and, in the Peninsula, it is found in lowland forest from the Langkawi Islands to Singapore. It is one of the species collected by Koenig when he visited Malaya in 1779. In size and wing shape the butterfly somewhat resembles *E. hypermnestra*, but it is dark brown above and the hindwing has a pale buff border bearing a series of dark submarginal spots. In flight in the forest this butterfly may be mistaken for *Euploea midamus*.

Of the remaining Malayan species of *Elymnias*, few are likely to fall to the collector, for all are rare and confined to heavy forest. *E. nesaea lioneli* Fruhstorfer is a passable imitation of *Danaus agleoides* or *D. vulgaris* when settled with expanded wings. When in flight in the forest, however *E. nesaea* is quite unlike a *Danaus*; indeed, on one occasion we mistook it for a Geometer moth. On the upperside, the male and female of *E. casiphona saueri* Distant bear a likeness to the corresponding sexes of *Euploea mulciber*. *E. patna hanitschi* Martin, which is rarer than any of the species so far mentioned, seems to be confined to the hills. The upperside suggests a *Euploea* species, but the underside is almost without the usual *Elymnias* striations, except in the tornal area of the hindwing.

E. penanga penanga (Westwood) differs from the other Malayan species of the genus in having the forewing apex rather pointed and the hindwing termen entire. The male is deep blue above, with a series of paler post-discal streaks on the forewing. The female is polymorphic and several forms have been named. In ♀-form *penanga* (Westwood), the wings are greenish black above with a white subapical band on the forewing; in ♀-form *abrisa* Distant, the forewing is unmarked, although the hindwing may have an obscure pale bluish submarginal patch.

E. kamara erinyes Nicéville, another frequenter of lowland forest, has both wings dark brown, and the distal area of the hindwing is pale buff, with faint darker striations and the veins broadly dark dusted in the pale area. *E. dara darina* Fruhstorfer is easily recognised by the faintly lilac-tinged white post-discal bands on the upperside, and, on the hindwing, the band has black submarginal spots. The butterfly is usually found associated with bamboo.

E. harterti harterti Honrath is exceedingly rare and only two specimens (both males) of the typical race are known. The holotype was taken near Kuala Kangsar, in Perak, by E. Hartert in 1888, and the second specimen was bred from a larva found at Setapak, near Kuala Lumpur,

feeding on *Cocos nucifera*, by N. C. E. Miller in 1933. The butterfly is indigo black, with a faint greenish subapical fascia on the forewing and a pale greenish white border, with black interneural spots, on the hindwing.

In the cabinet, the female of *E. esaca esaca* (Westwood) is, on the underside, a good copy of *Delias ninus* or *D. aglaja*. It may be that this resemblance holds good in the field when the *Elymnias* is at rest with closed wings. On the other hand, a female taken in flight in Bentong Forest Reserve by the writer in no way resembled a *Delias*, and was recognised for what it was. It may be mentioned that Malayan captures of *E. esaca* at altitudes above 2500 feet are rare, while *Delias aglaja* is very rare below this elevation. The male of *E. esaca* is black above with a pale blue macular marginal band on both wings.

The female of *E. kuenstleri kuenstleri* Honrath bears a striking resemblance to *Idea lynceus* or *I. jasonia* in flight, and the male closely resembles *Euploea algea*. The female holotype of the species was taken near Tanjong Malim, in south Perak, by Künstler in 1881-1885. A second female was captured on Gunong Angsi by A. R. Sanderson in 1919, a pair were taken by Corbet in March, 1931, on Bukit Kutu, and a Dyak collector employed by Pendlebury took a second female on Bukit Kutu a few days later. This remarkable species has been found in Sumatra, Borneo and Java, but only a single female is known from Borneo (see Plate 24).

FAMILY AMATHUSIIDAE

This family is almost without representatives in the temperate regions, practically all the species being confined to the eastern tropics. Most of the butterflies are large and robust, many are brilliantly coloured with metallic blue, and, with very few exceptions, they are confined to dense primeval forests. Many of the larger species show greatest activity in the early morning and again in the late afternoon towards sunset.

In structural characters the Amathusiidae are closely related to the Nymphalidae (q.v.), but they differ in having the lower angle of the comparatively short and broad forewing cell acutely produced. The palpi are usually long and prominent, projecting well beyond the head and laterally compressed. In all the Malayan forms, the antennal club is long and gradual, and the eyes are smooth. On the forewing, vein 10 arises from vein 7, except in *Enispe*, where it is absent. Usually, the wings have the termen entire and, in some species, the hindwing is weakly dentate or elongated to a lobe. The underside of the hindwing usually carries a submarginal ocellus in each of spaces 2 and 6.

Secondary sexual characters are strongly developed in the males; these usually comprise a fold in the dorsal area between veins 1a and 1b on the hindwing above, enclosing an extrusible hair tuft, and one or two hair tufts overlying a specialised area in the subcostal area of the hind-

wing. In some species there is a shining speculum in the dorsal area on the forewing beneath. In *Discophora* the male mark consists of a somewhat rounded thick patch of specialised scales in the discal area of the hindwing.

Many Amathusiids are timid and difficult to catch in heavy forest owing to their nimble flight, and also to the efficient manner in which they thread their way through tangled undergrowth. The most successful method of collecting them is to employ bait consisting of over-ripe fruit (see page 73). Certain species, especially *Enispe* and the female of *Zeuxidia aurelius*, are rarely taken by any other means.

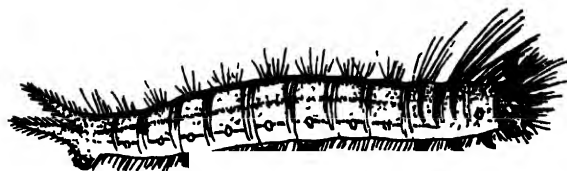


Fig. 50. *Amathusia phidippus*. Larva.

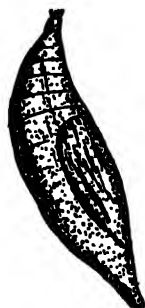


Fig. 51. *Amathusia phidippus*. Pupa.

The larvae most nearly resemble those of the Satyridae; they are cylindrical and somewhat centrally thickened, covered with a fine pubescence, and usually carry tufts of long hair. The head is armed with a pair of horn-like processes (absent in *Discophora* and *Enispe*), and the anal segment bears a pair of moderately long, posteriorly directed processes. The young larvae are usually gregarious. The food plants are species of monocotyledons.

The pupae are anally suspended, with the head drawn out to a bifid point enclosing the palpi.

Key to the Genera of AMATHUSIIDAE

- 1 (20) Forewing all veins present. Upperside not orange-brown with black markings.
- 2 (13) Forewing veins 11 and 12 free (fig. 52). Hindwing not tailed or lobed (except in *Amathusia*).
- 3 (10) Hindwing cell entirely open between veins 4 and 5 (fig. 52).
- 4 (9) Forewing with vein 10 arising from vein 7 nearer the apex of the wing than the end of the cell (fig. 52). Hindwing without a large black ocellus in space 2.
- 5 (6) Antennae much longer than half the length of the forewing. Upperside fulvous brown and unmarked. *Faunis*
- 6 Antennae about half the length of the forewing or less. Upperside hindwing tornal area yellow or orange.
- 7 (8) Forewing less than 40 mm. Antennae less than half the length of the forewing. Upperside pale grey, except for the yellow tornal area on the hindwing. Underside hindwing without ocelli. *Melanocyna*
- 8 Forewing longer than 40 mm. Antennae about half the length of the forewing. Upperside forewing with a white subapical band. Underside hindwing with ocelli in spaces 2 and 6. *Thauria*
- 9 Forewing with vein 10 arising from vein 7 about half way between the cell-end and the apex of the wing. Upperside hindwing with a large black ocellus on the orange area in space 2. *Tomeris*
- 10 Hindwing cell not entirely open between veins 4 and 5 (fig. 53).
- 11 (12) Hindwing cell closed by an obscure discocellular vein (visible by transparency after the use of benzene). Hindwing not lobate. Forewing with a yellow subapical band. *Xanthotarsus*

- 12 Hindwing cell partially closed by a membranous fold (fig. 53). Hindwing with a prominent lobe between veins 1b and 2. Underside forewing without a subapical band, and both wings with reddish brown and white transverse bands. *Amathusia*
- 13 Forewing veins 11 and 12 anastomosed (fig. 54). Hindwing tailed or lobed (except in *Discophora* and *Thaumantis klugius*). *Zeuxidia*
- 14 (15) Vein 4 on both wings with a spur directed towards the costa (fig. 54). Hindwing with a pointed tail between veins 1b and 2.
- 15 Vein 4 without a spur. Hindwing not caudate but may be lobate.
- 16 (19) Forewing with vein 7 arising at the apex of the cell; forewing apex not acute. Hindwing prominently lobed in *Amathuxidia* and slightly so in *Thaumantis*.
- 17 (18) Hindwing cell almost closed by a membranous fold. Underside greyish brown with the wings crossed by straight dark brown lines. *Amathuxidia*
- 18 Hindwing cell open. Upperside with blue or purple-blue areas. *Thaumantis*
- 19 Forewing with vein 7 arising well before the apex of the cell; forewing apex acute and slightly produced. *Discophora*
- 20 Forewing vein 10 absent (fig. 55). Hindwing tornus acutely produced. Upperside orange-brown with black markings. *Enipe*

Genus *Faunis* Hübner

Smaller in size than usual in the family.

In the male, the forewing dorsum is concave, and a hair tuft (not shown in the venation drawing) is situated just below the cubitus in space 1b on the hindwing.

The larvae have been found on *Musa*, *Pandanus* and *Smilax*.

Distributed from Sikkim and southern China through Malaysia to the Philippines and Celebes.

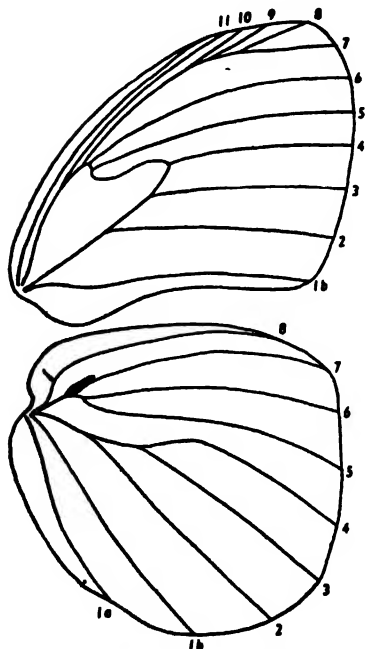


Fig. 52. *Faunis canens* ♂. Venation.

Key for the separation of the species of *FAUNIS*

- 1 (4) Underside hindwing with white post-discal dots in spaces 2 and 6.
- 2 (3) ♂ underside hindwing with the dark median band distinctly traceable from the costa to vein 1b. ♀ underside dark median band rather narrow (less than 2 mm.), not outwardly diffuse, and crenulate on the forewing. *F. canens*
- 3 ♂ underside hindwing dark median band not traceable below vein 3 on account of the dark tornal area. ♀ underside dark median band broader (more than 2 mm.), outwardly very diffuse, and not crenulate on the forewing. *F. kirata*
- 4 Underside hindwing with white-centred, orange-ringed, black ocelli in spaces 2 and 6. *F. gracilis*

Faunis canens arcesilas Stichel

Plate 38, figure 78 ♀

The Common Faun

Although much larger in size, this inconspicuous butterfly is not unlike *Mycalesis oroatis* in appearance; it is fulvous brown above, and the

underside is deep brown, with dark transverse lines and a submarginal series of whitish dots on both wings. In the closely allied but much rarer *F. kirala* (Nicéville), the tornal area of the hindwing beneath is much blacker, and some of the spots can be distinguished only with difficulty. These species are constant in colour and markings and the sexes are similar (Genitalia, Plate 5, figs. 49–50.)

The larva of *F. canens* is pale green, and densely covered with fine short white hairs which give it a whitish appearance. We have found it feeding on a wild species of banana (*Musa*) in the forest.

The butterfly is commonest from November to February, and flies close to the ground; it is found only in dense forest land, and favours localities where species of Zingiberaceae are growing. It is rarely seen above 3000 feet, and is distributed throughout the Peninsula. Abroad, the species occurs only in Burma, Indo-China and Malaysia.

F. gracilis (Butler) is smaller, more elegant, and more local than its commoner congener. It is distinctive in the reddish brown underside which, on the hindwing, bears two prominent, white-centred, black ocelli; in some individuals, there is a smaller and fainter submarginal ocellus in space 2 on the forewing (Genitalia, Plate 5, fig. 48.)

Genus *Melanocyma* Westwood

Structurally similar to *Faunis* but the wing pattern is strikingly different, the paler underside being marked with heavy black scrawls. Sexes alike.

The male secondary sexual characters on the upperside of the hindwing comprise a patch of specialised scales at the base of space 7, an upturned hair tuft just below the cubitus, and a dark patch of specialised scales overlaid with a sparse hair tuft near the distal margin in space 1b.

Life history unknown. A single species is distributed from Burma to Siam and Malaya. *M. faunula faunula* Westwood frequents much the same localities as *Faunis*, but it occurs up to about 5,000 feet and, in some places, it is not uncommon. It is much more lofty in flight than *Faunis*.

Genus *Tenaris* Hübner

Structurally rather similar to *Faunis* but the forewing is bluntly produced at the apex.

On the hindwing above, the male has an upturned hair pencil just below the cubitus in space 1b, and, in *T. horsfieldi*, there is an androconial patch covered with long hairs in space 1a near the margin (Genitalia, Plate 5, fig. 51.)

The wing pattern is very characteristic and comprises greyish black marginal shading (which extends over the whole of the wings in some species), with prominent yellow-crowned ocelli in spaces 2 and 6 on the underside of the hindwing, that in space 2 being visible above.

The larva is cylindrical, slightly flattened dorsally, with the ground colour reddish, yellowish or blackish. There is a pair of hard horns on the head, and tufts of hair on the sides of the segments.*

Except for the Malaysian *T. horsfieldi*, the genus is confined to the Papuan region, where it occurs in a bewildering multiplicity of forms. *T. horsfieldi birchi* Distant has a very restricted distribution, being confined to Singapore and south Johore. It is essentially an insect of primary forest. Very few specimens have been obtained since a male was first captured by Birch flying along a road in Singapore over sixty years ago.

Genus *Xanthotaenia* Westwood

Antennae much longer than half the length of the forewing. Forewing with vein 10 arising from vein 7 much nearer the cell-end than the apex of the wing. Hindwing rectangular, being slightly and bluntly produced at vein 2.

On the hindwing above, the male has a dark hair tuft along vein 1b which is nearer the termen than the base.

The adult is crimson-brown above, with a prominent yellow sub-apical band on the forewing, and with the usual ocelli on the paler underside. The female is larger than the male.

The life history is unknown, and the single species is confined to Burma and Neomalaya.

X. busiris busiris (Westwood) flies near the ground and haunts the same situations as *Faunis canens*, being especially fond of rather open forest with low-growing species of Zingiberaceae. Like *Faunis* also, this butterfly is on the wing during the earlier hours of the day, and is not often met with after 11 o'clock, unless disturbed. Although found on the mountains as well as the plains, the species appears to be most abundant at altitudes between 500 and 1,000 feet.

Genus *Amathusia* Fabricius

Plate 25

Large butterflies with the forewing sharply produced and the hindwing strongly produced at the tornus. Antennae less than half the length of the forewing. The adults are dull brown above, and transversely striped with reddish brown below.

On the hindwing above in the male is an erectile tuft of hairs in a pocket in space 1b, and there is a second and more prominent hair pencil in space 1a, which, however, is feeble or absent in *A. perakana*. The male abdomen has four lateral hair tufts. The male of *A. masina* is distinctive in having a cup-like depression with an overlying hair tuft in space 7 on the hindwing above. Small androconial scales are present on the upperside of the hindwing in the males of all species, and the male genitalia are similar in pattern throughout the genus.

* See Appendix, p. 493.

The larva has two short processes on the head, and two long backwardly directed processes on the anal segment; the thoracic segments are strongly hairy and each abdominal segment has a short dorsal tuft (figs. 50 and 51). The larvae feed on palms.

Malaysia is the headquarters of the genus, which extends to south Burma and the Andaman Islands in the west, and to the Philippines and Celebes in the east.

(Basic literature: Corbet and Pendlebury, 1936, 1938.)

Key for the separation of the species of *AMATHUSIA*

- 1 (12) ♂ upperside hindwing without a depression with an overlying hair pencil near the base of space 7. Underside reddish brown median band not remarkably broad and straight, but tapering towards the hindwing tornus, or indented on its outer edge near the hindwing subapical ocellus.
 - 2 (9) Underside forewing reddish brown median band not outwardly indented at veins 3, 4, 5 and 6. (*phidippus* group)
 - 3 (4) Forewing usually less than 48 mm. in ♂, and less than 54 mm. in ♀. Underside with a very faded appearance and no white lines. ♂ upperside forewing dark brown, with an ochreous hue, and with the obscure orange-brown submarginal band inwardly straight. Found in coconut plantations. *A. gunneryi*
 - 4 Forewing 48 mm. and longer in ♂, and 52 mm. and longer in ♀. Underside colouring more intense and markings more contrasted.
 - 5 (8) Forewing less than 54 mm. ♂ upperside hindwing not conspicuously darker than the forewing.
 - 6 (7) Underside not conspicuously reddened. ♂ upperside dark purple to ochreous brown, with the forewing dull orange-brown submarginal band inwardly serrate.
 - 7 Underside conspicuously reddened, and the white stripes slightly reddish. ♂ upperside dark brown with rich orange-brown subapical and submarginal bands, the latter inwardly slightly serrate, and of more uniform width than in *A. phidippus*. *A. binghami*
 - 8 ♂ forewing 55 to 56 mm. ♂ upperside dark brown, slightly tinged with ochreous, and with obscure dull orange-brown subapical and submarginal bands, the latter inwardly slightly serrated; hindwing conspicuously darker than the forewing. Underside reddish brown median band very broad, and the pale stripes very white. *A. perakana*
 - 9 Underside forewing outer edge of brown median band indented at veins 3, 4, 5 and 6. (*schoenbergi* group)
 - 10 (11) Underside forewing median band much more deeply indented at vein 4 than at vein 3. ♂ upperside dark purple-brown, with prominent orange subapical and submarginal bands on the forewing. *A. schoenbergi*
 - 11 Underside median band indentations at veins 3 and 4 about equal. ♂ upperside ochreous brown, without prominent orange-brown bands on the forewing. *A. ochraceofusca*
 - 12 ♂ upperside hindwing with an oval depression, with an overlying hair tuft, near the base of space 7. Underside reddish brown median band broad, very uniform in width, edges straight, and outwardly very narrowly pale bordered. Underside outer areas rich reddish brown, and the pale stripes in the basal halves very white. *A. masina*
- Identification of females may be difficult and is best carried out by comparison of the underside with those of determined males.

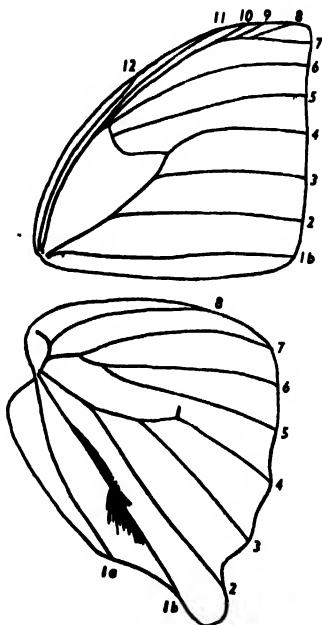


Fig. 53. *Amathusia phidippus* ♂. Venation.

Amathusia phidippus chersias Fruhstorfer*Plate 38, figure 81 ♂; genitalia, Plate 5, figure 52*

The Palm King

The species of the *phidippus* group of the genus *Amathusia* are so similar that their identification may be a matter of considerable difficulty. The butterflies are dull dark brown above; the males are unmarked, except for the somewhat obscure diffuse orange-brown subapical patch on the forewing, and the narrow submarginal bands of the same colour on both wings, while the females have the forewing subapical band broader yellower and more prominent. The underside is patterned with alternate reddish brown and whitish bands and stripes, and the hindwing has large submarginal ocelli in spaces 2 and 6.

A. phidippus occurs from south Burma to the Philippines and Celebes, and is quite the most widely distributed species of the genus. It can be recognised by its size (forewing length about 48 mm. in the male and 52 mm. in the female), and by the sharply contrasted pattern on the underside. It is found in primary forest on the plains, and in coconut plantations, but it is not common in Malaya though it is distributed from the Langkawi Islands to Singapore, and there are records from Kedah Peak at 3200 feet. In the form from the Langkawi Islands, which may represent a distinct race, the underside has a more glazed appearance and is slightly violet-washed.

The butterfly is crepuscular in habit, and is not usually seen in the daytime unless disturbed.

The larva has been described as light pinkish brown, with dark brown lateral and dorsal lines, and with a black transverse band on the IIrd and IIIrd thoracic segments. One of the larval food plants is *Cocos nucifera* (coconut).

With the exception of *A. gunneryi*, little is known regarding the other Malayan species of the genus, most of which are distinctly rare.

In *A. binghami* Fruhstorfer and *A. perakana perakana* Honrath, the underside pattern is similar to that of *A. phidippus*. *A. perakana* is large, and has the underside markings more sharply contrasted. *A. binghami* can be recognised immediately by the reddish brown ground colour of the underside.

In the two largest species, *A. schoenbergi schoenbergi* Honrath and *A. ochraceofusca ochraceofusca* Honrath, the outer edge of the broad reddish brown band on the forewing beneath is sinuate and indented at vein 4. In the first-named species, this indentation is deep, but is less marked in the less rare *A. ochraceofusca*.

In *A. masina malaya* Corbet and Pendlebury the underside is reddish, the reddish brown median band is much broader than usual, its outer edge is very straight, and the white edging is almost obsolete. The male is easily recognised by the oval depression, which is overlaid by a hair tuft, near the base of space 7.

The rarer species of *Amathusia* are found only in dense forest, and it is believed that their larvae feed on palms.

***Amathusia gunneryi* Corbet and Pendlebury**

Plate 38, figure 80 ♀

The Faded Palm King

In the Malay Peninsula occurs an *Amathusia* which formerly passed as a pale form of *A. phidippus chersias*, but we now consider it is better regarded as a distinct species, although we are not entirely satisfied regarding its status. It is often abundant in coconut plantations in and around Kuala Lumpur, but otherwise it is known in Malaya only from a few odd specimens from Penang and Perak (Taiping and Telok Anson). We have seen no specimens of earlier date than 1896.

A. gunneryi differs from Malayan *A. phidippus* in that, in both sexes, the forewing termen is straighter and the apex less pointed, and, on the underside, the wings are rather uniformly coloured pale reddish buff and without the sharp contrasts found in *chersias*. On the upperside, the male has the orange-brown subapical markings found in *chersias* almost obsolete, and the female has the bands on the forewing dull ochreous brown and not bright yellow as in *chersias*.

The Bornean race of *A. phidippus* (subspecies *dilutus* Fruhstorfer) somewhat resembles *A. gunneryi* in the faded appearance of the underside, but the wing shape and general appearance show it to be a true *A. phidippus* form.

There is evidence suggesting that *A. phidippus* shows an unusual tendency towards the formation of new races, and it may be that *A. gunneryi* is a local race which is on the point of becoming a separate species. It is worthy of remark, however, that, during the five years that Corbet had *A. gunneryi* under close observation in his garden at Kuala Lumpur, and when between one and two hundred specimens were examined on fruit bait, all were of the usual *A. gunneryi* type and nothing approaching *chersias* was seen.

The green larva of *A. gunneryi* feeds on the coconut palm, where it is found resting along the mid-rib of the leaf, and it can be distinguished from its background only with difficulty. The green pupa is suspended anally from a leaf of the food plant.

The butterfly spends the day at rest in the tops of coconut palms, where the underside pattern harmonises so closely with the grey fibrous covering at the base of the flower stalks that the insect must be invisible to predatory enemies. At dawn and at sundown the butterflies fly swiftly around the tops of the palm trees; sometimes large numbers may be seen in rapid flight at the tops of favoured flowering trees. During December and January the butterflies are often locally quite common, although rather scarce during the remaining months of the year.

Genus *Amathuxidia* Staudinger

Structurally very close to the last genus but veins 11 and 12 on the forewing are anastomosed.

The male has a speculum below the cubitus, and a second, larger speculum along the dorsum on the forewing beneath; on the upperside of the hindwing there is a broad patch of velvety scales in the cell area, and a large extrusible hair tuft in a pouch lying along the inner edge of vein 1b.

The genus is distributed from Assam and Burma through Malaysia, to the Philippines and Celebes.

The single Malayan species *A. amythaon dilucida* (Honrath) has the rather light greyish brown underside crossed by half-a-dozen straight dark brown lines and the usual large ocelli in spaces 2 and 6 on the hindwing. The male is black above with a broad purple-blue band on the forewing extending almost from base to tornus, while, in the female, the narrower subapical band is coloured orange.

A. amythaon is rather rare in primary forest, and is more in evidence on the plains than in the hills. The butterflies do not fly much unless disturbed, and, even then, they do not fly far. They are most readily caught at fruit bait.

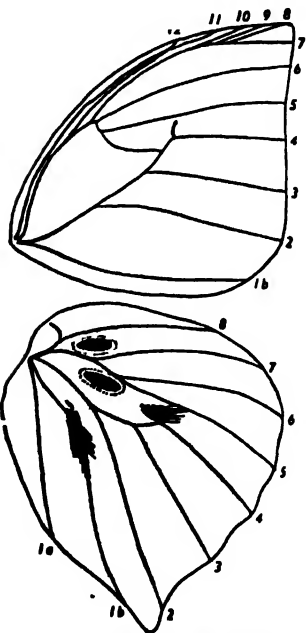


Fig. 54. *Zeuxidia amethystus* ♂. Venation.

Genus *Zeuxidia* Hübner

Hindwing cell open, although the spur from vein 4 may be mistaken for a discocellular vein.

The males have prominent secondary sexual characters. On the upperside of the hindwing is an elongate patch of specialised scales at the base of space 7, and a similar patch in the cell, and both have over-lying hair pencils; a further tuft of hairs is enclosed in a fold on the inner edge of vein 1b.

The large, brilliant, purple-blue patches on the upperside in the male are replaced by whitish markings in the female. The underside is leaf-like.

Larva with paired processes on the head and anal segment, and thickly covered with hairs.

Distributed from Burma through Malaysia to the Philippines.

Key for the separation of the species of ZEUXIDIA

- 1 (4) ♂ upperside forewing only extreme distal end of cell blue. ♀ upperside markings not pure white.

- 2 (3) ♂ upperside hindwing blue border not above vein 4. ♀ upperside forewing markings pale yellow; upperside hindwing apex pale orange. *Z. amethystus*
 3 ♂ upperside hindwing blue border from tornus to costa. ♀ upperside markings pale violaceous. *Z. doubledayi*
 4 ♂ upperside forewing distal half or two-thirds of cell blue. ♀ upperside markings pure white. *Z. aurelius*

***Zeuxidia amethystus amethystus* Butler**

Plate 38, figure 82 ♂; Plate 39, figure 83 ♀

The Saturn

The genus *Zeuxidia* comprises large butterflies which are closely allied to the "Morphos" of South America; in colouring, however, they fall far behind their American cousins, whose wings were employed so extensively in articles of jewellery.

The male of *Z. amethystus* is black above, with a broad iridescent blue discal band on the forewing, and a large tornal patch of the same colour on the hindwing. The under surface presents a leaf-like appearance, and the hindwing has a large ocellus situated in each of the spaces 2 and 6. The female resembles the male beneath, but, on the upperside, there is a pale yellowish fascia on the forewing, and the apical area of the hindwing is dull orange.

Z. amethystus is not uncommon, and may be found near streams and waterfalls in dense forest. It seems to be generally distributed throughout the Peninsula at all elevations up to about 4,500 feet; the female is rather rarer than the male. The butterfly is usually taken in the early morning or in the late afternoon, and it is partial to fruit bait, as are its two congeners.

The life history is unknown. The species is practically confined to Siam, Malaya, Sumatra and Borneo, and it is a common butterfly on the last-mentioned island.

Z. doubledayi doubledayi Westwood is rarer than *Z. amethystus*, but occurs in the same localities. It is slightly larger, and the male differs in that the blue tornal patch on the hindwing is continued as a broad band to the costa; in the female, the yellowish markings of *Z. amethystus* are replaced by lilac spots (Genitalia, Plate 5, fig. 53).

In the male of the larger *Z. aurelius aurelius* (Cramer), the whole of the costal half of the forewing is coloured a pale iridescent blue, and the hind-wing may have a wedge-shaped blue patch at the tornus. The female attains a wing expanse of 145 mm., and has the greatest wing area of any Malayan butterfly; it is marked with chalky white patches in a manner rather similar to that of *Z. amethystus*.

Genus *Thaumantis* Hübner

Antennae rather longer than half the length of the forewing. Forewing with vein 11 anastomosed with both veins 12 and 10. Wings rather rounded, but in *T. noureddin* the forewing is slightly angled at vein 6 and the hindwing lobed between veins 1b and 2.

The male has a speculum below the cell on the underside of the forewing, and a corresponding nacreous area on the hindwing above, with one (*T. odana* and *T. klugius*) or two (*T. noureddin*) overlying hair tufts in the anterior part of the cell; below the nacreous area the hindwing cell has a large black patch of specialised scales, and there is a sparse pecten of hairs along the basal portion of vein 1b.

The adults have blue or purple iridescent patches on the upperside, and a cryptic pattern on the underside. The females are larger, paler, and less brilliantly coloured.

The larvae are pubescent, with the hair arranged in tufts, and with the usual paired processes on the head and anal segment.

Distributed from Sikkim to Malaysia.

Key for the separation of the species of *THAUMANTIS*

- | | | |
|---|--|---------------------|
| 1 | (2) Upperside forewing with a broad shining blue band running from the mid-costa towards the tornus. | <i>T. odana</i> |
| 2 | Upperside forewing without such a band, but with the wing bases obscurely blue. | |
| 3 | (4) Upperside forewing cell not blue. | <i>T. noureddin</i> |
| 4 | Upperside forewing cell entirely shining blue. | <i>T. klugius</i> |

Thaumantis noureddin noureddin Westwood

Plate 38, figure 79 ♂

The Dark Jungle Glory

The wings are dark brown above, with the bases shining purple-blue (very obscurely so in the male), and the forewing has a submarginal fascia of diffuse, whitish spots. The female is larger and paler than the male, and has a curved whitish subapical fascia on the forewing. The dark greyish brown underside has a white post-discal line, which is proximally shaded with dark brown, and the hindwing has the usual ocelli in spaces 2 and 6.

The larva is very hairy, the head is armed with a pair of small horns, and the anal segment has paired processes which are directed upwards; there is a series of tubercles bearing short hair tufts. The pupa has a long head which is distinctly bifid.

In *T. klugius lucipor* Westwood the iridescent deep blue colour extends from the bases to the black submarginal border in the male, and it covers nearly half of both wings in the female. *T. odana pishuna* Fruhstorfer has an oblique blue band on the forewing, which is pale and brilliant in the male, and duller and more purple in the female. Both *T. klugius* and *T. odana* have a pale narrow subapical band on the underside of the forewing.

The *Thaumantis* species frequent much the same localities as *Zeuxidia*, except that they are more often found in bamboo thickets. They are on the wing later in the day, however, and fly very close to the ground, in consequence of which habit they are more often seen than captured. We have never taken any of the species at fruit bait.

Genus *Thauria* Moore

Forewing rather quadrate, and the hindwing rounded and slightly scalloped. Very large butterflies, and the female larger than the male.

On the upperside of the hindwing the male has a large black patch of specialised scales, clothed with long hair in and above the cell, and near the dorsal margin is a nacreous area with a hair pecten lying along vein 1a (Genitalia, Plate 5, fig. 54.)

Life history unknown. A single species distributed from Burma to Malaya and Borneo.

T. aliris pseudaliris (Butler) has the upperside a deep, rich brown, with a white oblique post-discal band on the forewing, and the apical and tornal portions of the hindwing broadly coloured orange. It cannot be confused with any other species and is less rare on the forested hills than on the plains.

Genus *Discophora* Boisduval

Antennae about half the length of the forewing. Forewing with vein 11 anastomosed with both veins 12 and 10. Hindwing cell open.

The male has a rounded, raised patch of specialised scales in the disc at the origin of veins 3 and 4 on the upperside of the hindwing. The male genitalia of all three species are figured on Plate 5 (figs. 55-57).

The butterflies are drab in colouring, with pale yellowish or pale blue fasciae in the outer areas, and the cryptic pattern on the underside has the usual ocelli in spaces 2 and 6 on the hindwing. The females are larger, and with brighter and more prominent markings.

The larva is clothed with long tufts of hair, and the anal segment has the usual paired processes. The favourite food plant is bamboo, but coconut, sugar cane and *Imperata* have also been recorded.

The genus is distributed from Ceylon and India to China, and through Malaysia to Lombok and the Philippines.

Key for the separation of the species of *DISCOPHORA*

- 1 (2) ♂ upperside hindwing with the black brand oval and rather obscure, and situated in the extensively blackened discal area. ♀ upperside with three series of spots, which are mostly white on the forewing and orange on the hindwing. *D. sondaica*
- 2 ♂ upperside hindwing with the large black brand in the discal area circular and prominent. ♀ upperside forewing with a very broad, orange subapical band.
- 3 (4) ♂ upperside forewing with a few obscure whitish sub-apical spots. ♀ underside inner edge of the median band straight, with the dark edging highly zigzagged. *D. timora*
- 4 ♂ upperside forewing with a pale blue macular band. ♀ underside inner edge of the median band slightly curved and the shading not zigzagged. *D. nacho*

Discophora timora perakensis Stichel

Plate 39, figure 84 ♂, 85 ♀

The Great Duffer

The male is dark brown above, with series of obscure pale yellowish white spots in the apical half of the forewing, and with a large black circular brand near the end of the cell on the hindwing. The female is

dark brown above, with a broad orange subapical band on the forewing. The underside is rather dark ochreous brown, somewhat heavily striated, and with an ill-defined median band running from the costa of the forewing to the tornal angle of the hindwing ; on the hindwing are post-discal ocelli in spaces 2 and 6.

The butterfly is taken occasionally in gardens and villages, although it is primarily a denizen of the forest. It is often found in the vicinity of clumps of bamboo, the food plant of the larva. It is crepuscular in habit and flies quite late in the evening ; we have taken a female at fruit bait as late as 9.30 p.m

The larva is brown, with paler longitudinal, dorsal, and lateral bands. There are the usual paired anal processes, and each segment bears dorsal and lateral tubercles studded with tufts of hair. The pupa is pale purple-brown.

The species occurs from Sikkim to Burma and the Malay Peninsula.

There occur also in the Peninsula, *D. necho engamon* Fruhstorfer and *D. sondaica despoliata* Stichel. The first-named, which is extremely rare, is closely allied to *D. timora* but, in the male, the fasciae in the outer half of the forewing are pale purple. The females of *D. timora* and *D. necho* are very difficult to separate. In *D. sondaica*, which has the hindwing angled at vein 4, there are three transverse series of diffuse pale orange and whitish spots in the female, while the male has a few obscure bluish spots on the forewing. *D. sondaica* is not uncommon and frequents much the same situations as *D. timora*. None of the species ascends the hills.

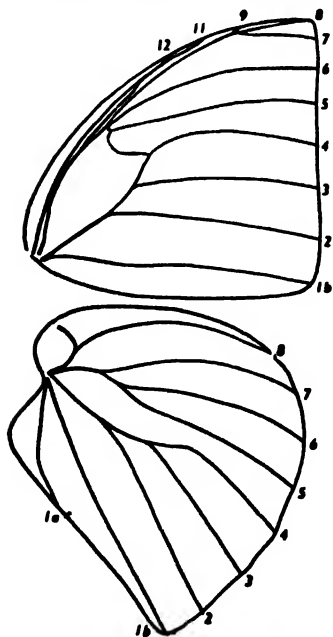


Fig. 55. *Enispe euthymius* ♂.
Venation.

Genus *Enispe* Doubleday

Structurally similar to *Discophora* but vein 10 is absent from the forewing. The male has a speculum below the cell on the underside of the forewing, and the cell and the basal area of space 1b on the upperside of the hindwing are clothed with long hair. The female is paler and larger than the male.

The life history is unknown. Distributed from Sikkim to Neomalaya and western China.

E. euthymius corbeti Pendlebury is a comparatively recent discovery in

Malaya. On the upperside, the wings are orange brown, heavily marked with black spots and thick zig-zagged lines. The underside is dull reddish brown with a faint lilac tinge in certain lights; there is a rather broad median band crossing both wings, some of the markings from the upper-side show through faintly, and there is a white-centred black ocellus in each of the spaces 2 and 6 on the hindwing. The species is confined to heavy forest, and has been taken on fruit bait in central Malaya at altitudes up to 4,000 feet. It occurs from Sikkim to Neomalaya.

FAMILY NYMPHALIDAE

The Nymphalids

The species comprised in this extensive family are often large brightly coloured butterflies which attract the attention of the most casual observer. Many are widely distributed, the "Painted Lady" (*Vanessa cardui*), for instance, having considerable claim to be regarded as the butterfly with the greatest geographical range.

The Nymphalidae are characterised as follows : Fore-tarsi imperfect, brush-like, and useless for walking in both sexes, although usually longer (comprising several segments) and often spined in the female. (The female of *Stibochiona* is exceptional in having a pair of claws on the fore-tarsi.) The forewing has all veins present, the cell is not remarkably broad, and its lower angle is not produced. The forewing has vein 10 arising direct from the cell in all genera except *Cupha*, *Phalanta*, *Vagrans*, *Cethasia*, *Chersonesia*, *Idrusia* and the *hordonia* group of *Neptis*, in which it originates from vein 7. The hindwing has a precostal vein, and the hindwing cell is open or, in the case of about a dozen genera, weakly closed by a non-tubular vein. In general, the antennae are less than half the length of the forewing costa, but they are longer in *Chersonesia*, *Lebadea* and the *Euthalia* group. Usually, the club is rather long, gradual and cylindrical, but it is somewhat flattened in the *Ariadne*, *Cupha*, *Limenitis* and *Apatura* groups. In *Terinos*, the *Vanessa* group and the genera of the *Cupha* group other than *Cupha*, however, the club is oval or pear-shaped, flattened, and more abruptly formed.

The butterflies are of medium or large size ; often the terminal margins are scalloped, crenulate or dentate, and the hindwing may be caudate.

Male secondary sexual characters are absent or weakly developed, except in *Ariadne* and *Terinos*.

In many species the ground colour of the wings is bright brown or yellowish brown, and some affect striking or beautiful colour patterns. Many species exhibit sex dimorphism, and the majority of the *Euthalia* species show this phenomenon to a marked degree. In a few species the female is polymorphic. *Euthalia monina* is remarkable in that the male is polymorphic ; in *Cyrestis cocles* both sexes are dimorphic. A few

species bear a mimetic resemblance to butterflies in other families ; the female of *Hypolimnas misippus* is totally dissimilar from the male and is a faithful copy of *Danaus chrysippus*, the two female forms of *Idrusia* bear a close resemblance to the two sexes of *Euploea diocletianus*, and *Hestina nama* may be mistaken for one of the bluish grey *Danaus* species. Two or three species have leaf-like patterns on the under surface, the best example being the Indian Leaf Butterfly (*Kallima paralekta*) which is fond of flying near the forest floor. In flight it is very conspicuous, for the upperside is brightly coloured with blue and orange, but when settled with closed wings among dead leaves it becomes invisible.

Although the Nymphalidae that exhibit seasonal dimorphism in countries with seasonal changes are almost always of the wet-season form in Malaya, with the dry-season form occurring as an occasional aberration, some of the *Precis* species in Kedawi occur in dry-season forms during the pronounced dry period from December to February.

As a rule, the Nymphalids are sun-lovers, and are often seen at flowering plants in the garden and forest ; some of the larger species are attracted by over-ripe fruit, carrion or animal excreta. The flight is usually strong and rapid, and the butterflies often sit with expanded wings on the upper surface of a leaf exposed to the sun.

Some of the Nymphalidae have a restricted range as far as Malaya is concerned ; for instance, several species of *Neptis*, *Parathyma* and *Euthalia* are found only on the hills and some are confined to Kedawi. *Precis hedonia* is practically restricted to Singapore Island, south Johore and Pulau Tioman.

Many species of Nymphalidae are regular migrants, and the movements of *Vanessa cardui* have been noticed for about 200 years. Other species recorded as showing migratory tendencies in the Oriental Region are *Phalanta phalantha*, *Cirrochroa emalea*, *Hypolimnas bolina* and *H. misippus*. A few other species have been reported as taking part in migratory movements, but the records are too sparse to admit of their being regarded as regular migrants. These are *Cupha erymanthis*, *Vindula erota*, *Precis* species, *Doleschallia bisaltide*, *Kallima paralekta*, *Cyrestis cocles*, *Neptis hylas*, *Ariadne ariadne* and *A. merione*.

The larvae show considerable diversity of form and armature, but the majority are cylindrical and are protected by branched spines, termed *scoli*. They are mostly gregarious, and feed on a variety of Dicotyledons. The larval characters have proved the most satisfactory basis for grouping related genera in the Nymphalidae.

The pupae are suspended anally, and the head and thorax often carry angular prominences. Many of them are burnished with brilliant metallic tints.

Key to the Groups of Genera of NYMPHALIDAE

In this work we have adopted, with slight modification, the arrangement used by Fruhstorfer in Seitz (volume 9) which is based essentially on larval characters, and has been derived from Schatz's arrangement in Staudinger and Schatz (1885-1892). In most of the

groups the adults share a sufficient number of characters for the diagnosis to have some practical value, but such is not invariably the case, and it is particularly difficult to separate the adults of the *Vanessa* and *Apatura* groups, although the larvae are abundantly distinct.

- 1 (20) Forewing origin of vein 8 nearer the apex of the wing than the end of the cell (fig. 56).
- 2 (3) Forewing subcostal vein swollen at the base (fig. 56). Palpi third segment long and porrect. Eyes smooth. Forewing angled at vein 6; hindwing crenulate and not toothed or tailed. *Ariadne* Group (p. 191)
- 3 Forewing no veins swollen at the base (fig. 59).
- 4 (5) Mid and hind tarsal claws very long (1.0 mm.) (fig. 60). Forewing vein 10 arises from vein 7. Wing margins crenulate. Eyes smooth. Upperside orange-red (rarely green) with black bordering, and with a white subapical fascia on the forewing. *Cethosia* Group (p. 201)
- 5 Tarsal claws short as usual. Forewing vein 10 arises from the cell (fig. 59) (except in *Cupha*, *Phalanta*, *Vagrans*, *Chersonesia*, *Idrusia* and the *hordonia* group of *Neptis*).
- 6 (7) Forewing vein 8 to the costal margin (fig. 68). Hindwing toothed or tailed at vein 4 (very slightly toothed in *Chersonesia peraka* and *C. intermedia*). Eyes smooth. Upperside with narrow transverse stripes. *Cyrestis* Group (p. 214)
- 7 Forewing vein 8 to the termen (fig. 59) (except in *Cupha*).
- 8 (9) Hindwing precostal vein arises at or before the origin of vein 8 (fig. 71). Hindwing not angled, dentate or caudate. Eyes smooth (except in *Limnitis* and in two species of *Parathyma*). Upperside black or brown with white, orange, greyish brown or green bands and stripes. *Limnitis* Group (p. 217)
- 9 Hindwing precostal vein arises after the separation of vein 8 from the radius (fig. 59).
- 10 (11) Forewing termen distinctly longer than the dorsum (fig. 73). Forewing vein 8 bent near its middle. Eyes smooth. Upperside greyish green or brown, with a hyaline discal band on the forewing. *Parthenos* Group (p. 226)
- 11 Forewing termen and dorsum subequal (fig. 59). Forewing vein 8 not bent in the middle (except in *Vindula*, *Cirrochroa* and *Terinos*).
- 12 (15) Palpi second segment much inflated, triangular, pale in colour, and with dark and rather stiff hairs; third segment very short (fig. 57).
- 13 (14) Eyes smooth. Forewing apex not truncate; hindwing not tailed or toothed at vein 4 (except in *Vagrans* and *Vindula*). Upperside orange, greenish or greyish brown; hindwing with one or more black submarginal lines. *Cupha* Group (p. 193)
- 14 Eyes hairy. Forewing falcate and truncate at the apex; hindwing caudate or angled at vein 4. Upperside deep purple; underside purple-brown with reddish brown and greyish blue transverse markings. *Terinos* Group (p. 200)
- 15 Palpi second segment not inflated; third segment relatively long as usual.
- 16 (17) Larvae with long, feathery, horizontally directed, lateral processes (fig. 79). Underside with large irregular spots in the cells and in spaces 6 and 7 on the hindwing; these spots are filled in with red in some species; the hindwing spots are obscure in some species of the *evolina* group of *Euthalia*, and they are yellowish or white in the *dirtea* group of *Euthalia*. Usually, the cell spots are present above and below. Eyes smooth. Forewing may be produced but not truncate (fig. 77). Hindwing entire or slightly crenulate, and not tailed or toothed. In many species ♂ upperside is black with a blue border on the hindwing, and ♀ has a pale post-discal fascia. *Euthalia* Group (p. 227)
- 17 Larvae not as above. Underside without these irregular spots in the cells and in spaces 6 and 7 on the hindwing.
- 18 (19) Larvae with branched spines (fig. 63). Hindwing lobed at vein 1b (slightly so in *Hypolimnas*) and shortly tailed at vein 1b in *Dolichochlora* and *Kallima* (fig. 62). Forewing apex more or less falcate and truncate (except in *Kallima* and only slightly so in *Symbrenthia*). Eyes smooth (except in *Vanessa*, *Polygona* and *Symbrenthia*). Non-mimetic (except *Hypolimnas*). (*Vanessa* Group p. 203)
- 19 Larvae smooth with paired cephalic and anal processes. Hindwing not lobed at vein 1b; slightly toothed at vein 4 in *Idrusia* and *Amnesia*, otherwise the hindwing may be crenulate but is not dentate or caudate (fig. 83). Forewing apex may be falcate, but is truncate only in *Herona*. Eyes smooth (except in *Dichorragia*, *Stibochlora* and *Eulacura*). Mostly mimetic. *Apatura* Group (p. 238)
- 20 Forewing origin of vein 8 much nearer the end of the cell than the apex of the wing (fig. 86). Hindwing tailed, toothed or lobed. Eyes smooth. Large and robust butterflies. *Charaxes* Group (p. 243)

Ariadne Group of Genera

Larva cylindrical, slender, with numerous branched spines, a pair of long, straight, branched spines on the head. Rather fragile butterflies.

Key for the separation of the genera of the ARIADNE group

- 1 (2) Upperside reddish brown. ♂ underside forewing with an extensive area of black specialised scales. *Ariadne*
- 2 Upperside ultramarine blue in ♂, brownish grey in ♀. Forewing more sharply angled than in *Ariadne*. ♂ without secondary sexual characters. *Laringa*

Genus *Ariadne* Horsfield

The reddish brown wings are crossed by narrow, black, sinuate lines and the underside is greyer. In the male, there is a greyish nacreous area (the speculum) in the costal area of the hindwing above and there is a large, black, velvety patch of specialised scales on the forewing beneath. The genus is distributed throughout the Oriental Region.

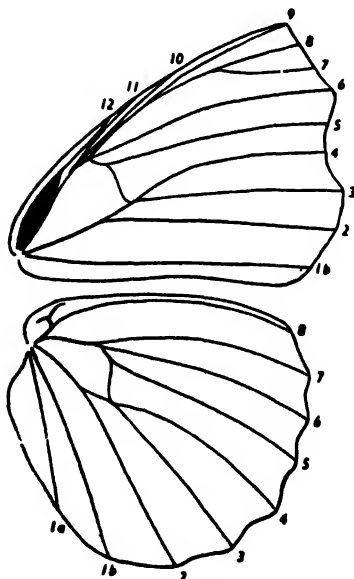


Fig. 56. *Ariadne ariadne* ♀. Venation.

Key for the separation of the species of ARIADNE

- 1 (4) Upperside both wings traversed by a single black discal line just beyond the cell-ends.
- 2 (3) Upperside and underside forewing with a white subapical spot. ♂ upperside hindwing speculum not below vein 6. *A. ariadne*
- 3 Upperside forewing without a white subapical spot. Wings less crenulate. ♂ upperside hindwing speculum extending to vein 5. *A. specularia*
- 4 Upperside both wings traversed by a narrow, zigzagged, orange-brown band just beyond the cell-ends.
- 5 (6) Upperside and underside forewing with a white subapical spot. *A. merione*
- 6 Upperside and underside forewing without a white subapical spot. *A. isaeus*

Ariadne ariadne ariadne (Linnaeus)

Plate 39, figure 86 ♂; genitalia, Plate 5, figure 58

The Angled Castor

Above, the wings are a rich reddish brown (the female paler), and traversed by five or six narrow, black, rather sinuate lines; the under surface is pale crimson brown and crossed by some irregular bands of a darker colour. There is a prominent white subapical streak on the forewing.

The butterfly is local, and usually found in forest clearings or in open spaces along jungle roads. Where it occurs it is often common, but is rarely found above 2000 feet. It is slow in flight and generally sails just above the low-growing shrubbery.

The spiny larva is black or brown, with whitish stripes, and a pair of long, branched spines on the head; it feeds on *Ricinus communis* (castor-oil

plant) and on the evil-smelling non-Malayan creepers *Tragia cannabina* and *T. involucrata*. *A. ariadne* is a wide-spread species, occurring from Ceylon and India through Malaysia to Formosa and Celebes.

The other species of *Ariadne* found in the Peninsula are much less abundant. The very rare *A. specularia arca* (Fruhstorfer), which appears to be confined to the Langkawi Islands as far as Malaya is concerned, is distinctive in that the grey shining speculum on the hindwing of the male extends into the distal portion of the cell. Both *A. merione ginosa* (Fruhstorfer) and *A. isaeus isaeus* (Wallace) occur at all usual altitudes, and the latter species can be separated from its congeners by the black male brand on the underside of the forewing being more extensive, and all the veins in the post-discal area strongly blackened.

Genus *Laringa* Moore

The genus is essentially Malaysian, and the only Malayan representative, *L. castelnaui castelnaui* (C. and R. Felder), is rare and local in primary forest. We found the male present in small numbers on Bukit Kutu in 1928 and 1931, but all our females have been obtained singly in lowland forest.

Cupha Group of Genera

Larva cylindrical, with branched spines and with (*Cupha*, *Vagrans*, *Vindula*) or without (*Phalanta*, *Cirrochroa*) a pair of long spiny processes on the head.

The butterflies have the upperside orange or greenish-brown with one or more black, sinuate, submarginal lines on the hindwing; hindwing usually crenulate but tailed or toothed at vein 4 in *Vagrans* and *Vindula*.

Distributed throughout the Indo-Australian Region with one genus, *Phalanta*, extending to Africa. It is characteristic of the group that a number of the species show migratory tendencies.

Key for the separation of the Genera of the CUPHA Group

- 1 (6) Forewing with vein 10 arising from vein 7, and vein 9 ending on the costa. Hindwing cell open or slenderly closed.
- 2 (3) Hindwing cell open. Forewing with vein 8 ending on the costa well before the apex. *Cupha*
- 3 Hindwing cell slenderly closed. Forewing with vein 8 ending almost at the apex.
- 4 (5) Hindwing not tailed. *Phalanta*
- 5 Hindwing with a short tail at vein 4. *Vagrans*
- 6 Forewing with vein 10 arising from the cell, and vein 9 ending at the apex (fig. 59). Hindwing cell open but partially closed by a fold in the wing directed towards the costa in *Vindula* and *Cirrochroa*. *Vindula*
- 7 (8) Hindwing tailed at vein 4. Forewing longer than 36 mm.
- 8 Hindwing not tailed. Forewing less than 36 mm.
- 9 (10) Hindwing cell partially closed by a fold in the wing from vein 4. Upperside orange-brown without a yellow transverse band. *Cirrochroa*
- 10 Hindwing cell entirely open. Upperside buff brown with a yellow discal band on both wings. *Paduca*

Genus *Cupha* Billberg

Medium sized brown or yellowish brown butterflies.

Distributed from India to the Solomon Islands. A single Malayan species.

Cupha erymanthis* lotis (Sulzer)Plate 39, figure 87 ♂*

The Rustic

The wings are orange brown with a broad yellow discal patch on the forewing, followed by a broad black apical area. A glance at the figure will immediately settle the identity of this species.

C. erymanthis is common throughout the Peninsula, in forest and in secondary growth, on the plains and at lower elevations. It may be found flying around shrubs and tall bushes on the forest edge, often in company with *Cirrochroa orissa*, to which it bears a superficial resemblance when on the wing. The same individual butterfly may remain near the same spot for several days. The species occurs in the Langkawi Islands and a distinct subspecies (*tiomana* Corbet), with the upperside more reddish, has been described from Tioman Island.

The larva is green or brown, with black branched spines, and has been found feeding on *Flacourtia* and *Erioglossum edule*. The pale green pupa is armed with red spiny processes. The species ranges from India and south China through Malaysia to the Lesser Sunda Islands.

Genus *Phalanta* Horsfield

Orange-brown butterflies, with black spots and streaks, and recalling the European "Fritillary" butterflies (*Argynnis* F.) in appearance and habits. Wings with both cells slenderly closed.

The genus is widely distributed throughout the Indo-Australian Region, and one species, *P. phalantha*, occurs also in tropical Africa.

Key for the separation of the species of PHALANTA

- 1 (2) Upperside forewing with two dark lines in the cell, excluding the cell-end stripes, these lines forming a single irregular cell spot. Forewing longer than 24 mm. *P. phalantha*
- 2 Upperside forewing with four dark lines in the cell, excluding the cell-end stripes, these lines forming two irregular cell spots. Forewing less than 24 mm. *P. alcippe*

Phalanta alcippe* alcesta CorbetPlate 39, figure 88 ♂*

The Small Leopard

In general appearance the species of *Phalanta* bear a resemblance to the English "Fritillary" butterflies; the wings have the same rich orange-brown coloration, and are ornamented with black spots and streaks. Of the two species found in the Peninsula, the larger is *P. phalantha phalantha* (Drury). Although similarly marked, the two species can be separated without difficulty as *P. alcippe* is shot with purple on the upperside, is distinctly darker in colour and has both wings bordered with black. The male genitalia of *P. phalantha* are figured on Plate 5 (fig. 5a).

P. alcippe is a common insect in forest clearings on the plains (it is taken rarely on the hills), and numbers are often found together. It flies around low-growing shrubs and is easily captured.

P. phalantha favours secondary growth and is fond of *Lantana* blossoms. Its distribution in Malaya is rather curious. Normally, it is a rather rare insect, but occasionally numbers may be encountered locally and then it disappears from the neighbourhood and may not be seen again for years. On the other hand, it is a common butterfly on many of the islands off the Malayan coasts. Both the *Phalanta* species occur on Tioman Island, where *P. alcippe* is represented by the more heavily marked subspecies *tiomana* Corbet.

The larva of *P. phalantha* has been described as dark brown to pale yellowish green, with short branched spines, at the base of each of which is a whitish spot; the food plants are *Flacourtia* and *Salix tetrasperma*. The handsome green pupa is ornamented, on the dorsal surface, with reddish tubercles, and the eyes and portions of the wing margins are defined with a golden line. The pupal period is about five days. In *P. alcippe*, the larva is green with interrupted brownish dorsal stripes, and the yellowish head has two black spots; the food plant is *Alsodeia zeylanica*.

P. alcippe is distributed from India through the Archipelago to the Solomon Islands. *P. phalantha* occurs from Ceylon to the Lesser Sunda Islands, and is found also in Madagascar and Tropical Africa.

Genus *Vagrans* Hemming

Formerly, but incorrectly, known as *Issoria* Hubner, of which the genotype is *I. lathonia* (L.).

Structurally, *Vagrans* is rather similar to *Phalanta*. The single species is distributed from India, through the Archipelago, to the south Pacific Islands.

Vagrans egista macromalayana (Fruhstorfer)

Plate 39, figure 89 ♀

The Vagrant

This butterfly is coloured a rich orange-brown, with brownish black bordering on the costal and distal margins of the forewing and on the distal border of the hindwing. Both wings are marked with darker spots and patches, and the hindwing is prominently tailed.

V. egista is a fairly common insect in Malaya, and favours quarries and other rocky spots on forest roads; it is more abundant on the hills than at lower levels. The flight is rapid, and the butterfly habitually returns to the same spot after being disturbed. It is partial to human perspiration.

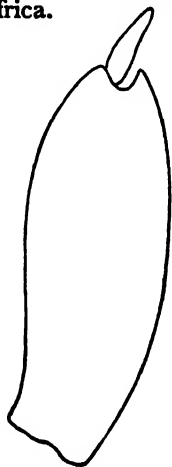


Fig. 57. *Vagrans egista*. Palp. Second and third segments.

The larva is similar to that of *Cupha erymanthis*, and also feeds on *Flacourtia*. The species is distributed from India as far east as the Pacific islands of Samoa and Tahiti.

Genus *Vindula* Hemming

Formerly, but incorrectly, known as *Cynthia* Fabricius, of which the type species is *Vanessa cardui* (Linnaeus).

Rather large sized butterflies.

The species of *Vindula* are distributed from Ceylon through the Archipelago to Australia, New Guinea and the Solomon Islands.

(Basic literature: Roepke, 1938; Pendlebury, 1939; Corbet, 1942c).

Key for the separation of the species of *VINDULA*

- 1 (2) Upperside forewing dark median line more or less straight, parallel to the discoidals, and, usually, at least 2 mm. from them in spaces 4 and 5.
 Upperside hindwing with a small but distinct blue-pupilled, orange-ringed ocellus in space 1b.
 ♀ upperside hindwing with the inner halves of the orange-ringed ocelli in spaces 2 and 5 not sullied. *V. arsinoe*
- 2 Upperside forewing dark median line lunulate, closer to the discoidals, the line in space 5 nearer the cell-end (within 1 mm. of discoidal vein) than that in space 4, and the short line in space 3 obliquely placed.
 Upperside hindwing submarginal ocellus in space 1b obsolete or obscure.
 ♀ upperside hindwing with the inner halves of the orange-ringed ocelli in spaces 2 and 5 sullied by the greyish green post-discal band.
 Upperside forewing orange (♂) or white (♀) subapical spot in space 7 usually more prominent than in *V. arsinoe*.
 Hindwing tail shorter, broader, and more obtuse than in *V. arsinoe*. *V. erota*

Vindula arsinoe erotella (Butler)

Plate 39, figure 90 ♂

The Cruiser

The male is a rich fulvous orange, and has a broad post-discal band of slightly paler colour on both wings. This band is broad at the costal margin of the forewing and narrows almost to a point near the tornus of the hindwing. The female is larger, and coloured a pale greenish grey with a white post-discal band. Both sexes have a short pointed tail at vein 4.

The butterfly is widely distributed in Malaya, but is not often common; it frequents open country as well as forest, and is strongly attracted by *Lantana* blossom. It is commonest on the plains, and becomes progressively rarer at altitudes up to about 2,000 feet. The distinct races occurring on Pulau Tioman (*tiomana* (Pendlebury)) and on Pulau Aor (*rafflesi* Pendlebury) are more uniformly coloured and more lightly marked than in *erotella* from the Malayan mainland.

Until recently it was believed that only a single species of *Vindula* occurred in the Indo-Malayan region, but it has now been found that two are present in Malaysia. The second species, of which the Malayan race is *V. erota chersonesia* Pendlebury (see Plate 30, figure 3 ♀) is more or

less confined to the hills in Malaysia, although both species may be found together at elevations between about 1,800 and 2,000 feet. They are not easy to separate, but, in general, the forms of *V. arsinoe* are smaller and have longer tails; further differences are given in the key on page 196. The males can be separated immediately by examination of the genitalia for, in *V. arsinoe*, (Plate 5, figure 61, ♂ genitalia), the innermost process of the valva (the *processus superior* of Roepke), is long, subspatulate and gently curved, while, in *V. erota* (Plate 5, figure 60, ♂ genitalia), it is shorter, hamuliform, and with a strong downward curve.

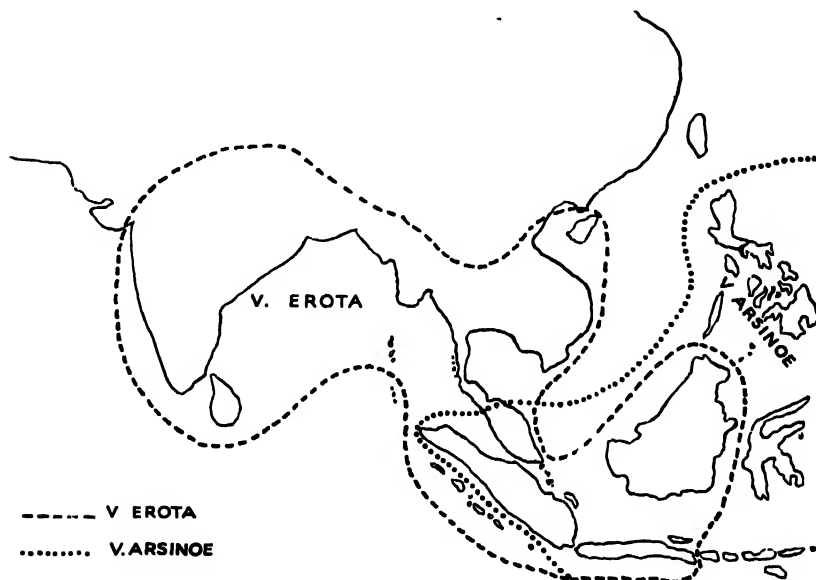


Fig. 58. Distribution of *Vindula erota* and *V. arsinoe*.

Until quite recently, *Vindula erota* and *V. arsinoe* were regarded as a single species, but the male genitalia are quite distinct, and in most parts of the range the two species can be separated on superficial characters. *V. erota* is confined to the hills in Malaysia, but, curiously enough, it is the only *Vindula* found on the Paramalayan islands off the west coast of Sumatra.

The larva of *V. erota* is pale yellow, marbled with brown, armed with branched spines, and with two upright horns on the head. The food plant is *Adenia palmata*. The pupa bears a remarkable resemblance to a dead and partly decayed leaf.

The distribution of the two *Vindula* species is rather curious*: *V. erota* is found in Ceylon, India, Hainan, Siam, Malaysia (hills only), Nias and the Mentawi Islands, while *V. arsinoe* occurs in Malaysia (including the islands of Tioman, Aor and Natuna), the Philippines,

* See Appendix, p. 493.

Celebes and Moluccas. The most northerly locality known for *V. arsiniae* on the mainland is in Legeh State in Peninsular Siam.

Genus *Paduca* Moore

Although structurally close to *Cirrochroa*, the adults are smaller in size, different in appearance, and with different habits. In the male, veins 5 and 6 on the forewing and veins 6 and 7 on the hindwing are comparatively broadly margined with buff brown specialised scales.

The life history is unknown. The genus is distributed from Burma and Malaysia to the Philippines and Celebes, and there is a single representative in New Guinea.

In *P. fasciata fasciata* (C. and R. Felder), the wings are greyish brown, with a pale yellow transverse band extending from space 4 on the forewing to near the middle of the inner margin on the hindwing. Both wings have yellow post-discal and submarginal fasciae, and beyond the transverse band on the hindwing is a series of black interneural spots. The species is very local in Malaya; it is feeble in flight and frequents secluded forest paths on the plains.

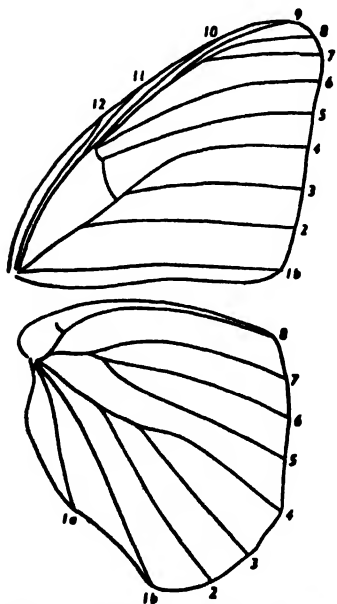


Fig. 59. *Cirrochroa tyche* ♂. Venation.

Genus *Cirrochroa* Doubleday

The antennal club is not well defined; the venation is as in *Vindula*. In the males, veins 6 and 7 on the forewing above (veins 5 and 6 in *C. satellita* and *C. orissa*), and veins 6 and 7 on the hindwing are narrowly edged with paler specialised scales.

Migratory flights of *C. emalea* have been observed in Borneo and, on a smaller scale, in Malaya.

The larva of one species has rather short branched spines, and has been found feeding on *Hydnocarpus*.

Distributed from Ceylon and India through the Archipelago to New Guinea.

Key for the separation of the species of *CIRROCHROA*

- 1 (8) Upperside forewing without a prominent, yellow, post-discal band.
- 2 (9) Underside silvery white post-discal band narrow and more or less uniform in width.
C. tyche
- 3 Underside forewing silvery white post-discal band increasing markedly towards the costa.
- 4 (5) Upperside forewing black marginal border not extending inwards beyond the sinuate submarginal line, even at the apex.
C. sarya

- 5 Upperside forewing black bordering extending inwards beyond the submarginal line, at least in the apical area.
- 6 (7) Underside hindwing silvery white post-discal band constricted in spaces 5 and 6. *C. emalea*
- 7 Underside hindwing silvery white post-discal band uniform in width throughout its length. *C. malaya*
- 8 Upperside forewing with a broad, yellow, post-discal band.
- 9 (10) Upperside with a broad, yellow, post-discal band on both wings. *C. satellita*
- 10 Upperside hindwing without a yellow band. *C. orissa*

***Cirrochroa emalea emalea* (Guérin-Méneville)**

Plate 39, figure 91 ♀; genitalia, Plate 5, figure 63

The Malay Yeoman

Of the Malayan species of *Cirrochroa*, *C. emalea*, *C. tyche rotundata* Butler, *C. malaya malaya* C. & R. Felder and *C. surya siamensis* Fruhstorfer are all fulvous orange above, with a black distal margin or with black sinuate marginal and submarginal lines. The under surface is paler, with a silvery white or whitish transverse band on both wings. In *C. tyche*, the pale discal band on the forewing beneath is narrow and more or less uniform in width, while it widens perceptibly towards the costa in the other three species. On the upperside, *C. surya* suggests a small *C. tyche*, while *C. emalea* and *C. malaya* have much broader black bordering on both wings. The last-named two species may be separated by the pale discal band on the underside of the hindwing being uniformly wide in *C. malaya* and constricted in spaces 5 and 6 in *C. emalea*.

C. surya (Genitalia, Plate 5, fig. 62) is confined to Kedawi and northwards, but the other species named are common butterflies which frequent the forest edge at all elevations. *C. emalea* occurs also in Pulau Tioman. All these species are rapid in flight, and usually have to be taken on the wing, although occasionally they are found at moist spots on the roadside.

Some of these species show migratory tendencies and there are records from Borneo of large numbers of *C. emalea* having been observed flying continuously in one direction for several days. We have seen a small migration in the north of Kedah, and noted the sudden appearance of *C. emalea* in large numbers on Bukit Kutu in March, 1931, although we have never witnessed a large movement of these butterflies.

C. emalea and *C. tyche* occur throughout Malaysia but *C. malaya* is not found in Java.

***Cirrochroa orissa orissa* C. and R. Felder**

Plate 39, figure 92 ♂

The Banded Yeoman

This is by far the commonest species of *Cirrochroa* in the Malay Peninsula, and it is often found in the same localities as, and in company with, *Cupha erymanthis*. The wings are rather dark ochreous brown, with a broad yellow oblique post-discal band on the forewing. The

forewing is broadly bordered with black at the apex. The female is paler than the male.

The butterfly is common at all suitable elevations throughout the Malay Peninsula, and, although more in evidence on the plains, it is not uncommon at hill stations. Outside Malaya, it occurs only in Burma, Siam, Sumatra and Borneo. The life history is unknown.

The rarer *C. satellita satellita* Butler resembles *C. orissa* somewhat but has a broad yellow transverse band extending from the mid-costa on the forewing almost to the tornus on the hindwing. It is taken singly near forest paths at all elevations. The species is confined to Neomalaya and Palawan.

Terinos Group of Genera

Larvae with long slender branched spines, including a pair on the head. The adults have angled wings and are quite distinctive in appearance. The males are remarkable for the large area of specialised scales on the upperside of the wings.

The single genus in this group occurs from south Burma, through the Archipelago, to New Guinea and the Bismarcks.

Genus *Terinos* Boisduval

Medium to rather large butterflies. Venation rather inconstant. The males have a large black patch of specialised scales in the tornal half of the forewing, and a similar but smaller area in the apical area of the hindwing. In the female, the lower discocellular vein meets the cubitus about midway between veins 2 and 3, but not nearer vein 3 as in the male.

Key for the separation of the species of *TERINOS*

- 1 (2) Underside hindwing with a prominent white submarginal band, becoming broad and lunulate in spaces 2, 3 and 4. Hindwing slightly dentate at vein 4. *T. terpander*
- 2 Underside hindwing with a narrow, pale bluish grey, lunulate submarginal band. Hindwing caudate at vein 4.
- 3 (4) Upperside hindwing with rather diffuse white submarginal spots in spaces 3 and 4. *T. attila*
- 4 Upperside hindwing with the outer margin pale orange, overlaid with purple dusting, and with dark purple submarginal lunules. *T. clarissa*

Terinos terpander robertsia Butler

Plate 5, figure 64, ♂ genitalia

The Royal Assyrian

The species of *Terinos* are rich purple above, with a white or pale orange area on the hindwing. The purple-brown underside is traversed by reddish brown and pale dull blue fasciae, and the hindwing has a series of dark, orange-ringed post-discal spots.

T. terpander is not uncommon, and is found on open forest roads at all usual elevations. Often, it is to be seen at moist spots on the roadside, and it frequents quarries and other rocky spots. The other species of

Terinos are much less common. *T. clarissa malayana* Fruhstorfer (Plate 40, figure 93, ♂) and *T. atlita teuthras* Hewitson are found singly in the same situations as *T. terpander*, but usually not above 2,000 feet. They are immediately distinguished from *T. terpander* by the more prominent tailed projection at vein 4 on the hindwing, and they may be separated from each other by the white, helmet-shaped spots in spaces 3 and 4 on the hindwing above in *T. atlita*, while, in *T. clarissa*, the outer area on this wing is coloured pale orange yellow, overlaid with mauve scaling, and there are present prominent purple submarginal lunules.

The larva of *T. terpander* is greenish with longitudinal stripes, the head yellow, and the spines blackish. It feeds on a species of *Antidesma**.

T. terpander is confined to Malaysia. Of the Malayan species, only *T. clarissa* extends as far north as Tenasserim.

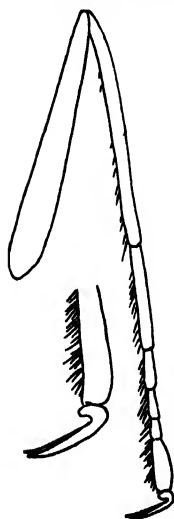


Fig. 60. *Cethosia biblis*. Mid-leg.

Cethosia Group of Genera

Larvae gregarious, with long branched spines, and brightly coloured, the segments being ringed with black and red or yellow. In the adult the hindwing cell slenderly closed.

The single genus is distributed from Ceylon and India through the Malay Archipelago to the Papuan sub-region.

Genus *Cethosia* Fabricius

Rather large and elegant butterflies, with the termens of both wings deeply crenulate. Upperside bright orange-red (rarely green), with black bordering, and with a white band or fascia on the forewing. The wings are richly variegated on the underside.



Fig. 61. *Cethosia penthesilea*. Larva.

Key for the separation of the species of CETHOSIA

- 1 (2) Upperside forewing without a white subapical band, the black apical area bearing a series of white sagittate markings. *C. biblis*
- 2 Upperside forewing with a white subapical band.
- 3 (4) Underside hindwing with a narrow, white, submarginal band outwardly defined by short black stripes. *C. penthesilea*
- 4 Underside hindwing without a white submarginal band. *C. hypsea*

Cethosia hypsea hypsa C. and R. Felder

Plate 40, figure 94 ♂

The Malay Lacewing

The genus *Cethosia* includes some of the most beautiful butterflies of Malaysia. Above, the species are bright orange-red and black,

* See Appendix, p. 494.

the red colour being confined to the basal area on the forewing, while the hindwing is entirely red except for the scalloped black distal border. The under surface is orange-red, both wings have whitish fasciae and are spotted with black, and the forewing cell has several black-edged, pale blue transverse stripes. The duller females are more heavily spotted in the orange-red areas on both wings. The butterflies emit a disagreeable odour when squeezed.

The commonest species, *C. hypsea*, has a white subapical band on the forewing, and it closely resembles *C. penthesilea methypsea* Butler (Plate 40, figure 95 ♀), but the latter species has, on the underside, a narrow, white, submarginal band. In *C. biblis perakana* Fruhstorfer the black apical area on the forewing is ornamented by a series of white spots and lunules (Genitalia, Plate 5, fig. 65; Plate 6, fig. 66.)

C. hypsea is not uncommon at flowering plants on forest roads at all usual elevations, and *C. penthesilea* is nearly as common in the same situations. The last-named is the only *Cethosia* species as yet found in Kedawi. *C. biblis* is much more local, being largely confined to the hills, and, in the few favoured spots where it occurs, it may be taken in some numbers. The female is much rarer than the male, and is found within the forest and not at its edge. In a second form of the female, the red colouring is wholly or partially replaced by dull green. A rather large, day-flying, Tineid moth, *Coryptilum rutilellum* (Walker), is often found in the neighbourhood of colonies of *C. biblis*, which it closely resembles in flight, though barely half its size.

The *Cethosia* larvae feed on *Passiflora* and, at least in the earlier stages, live gregariously. The larvae are black, banded with red and yellow and the blackish spines are reported to have urticating properties.

C. hypsea occurs in south Burma, Siam and Malaysia.

Argynnis Group of Genera

Larvae with branched spines as in the *Cupha* and *Vanessa* groups of genera.

The adults are orange-brown, with black spots and streaks, and are widely known as "Fritillaries." The antennal club is abrupt and spatulate, the eyes are smooth, and the palpi hairy.

The genus is almost cosmopolitan in distribution.

A. hyperbius (Linnaeus) has not yet been found in Malaya, although it occurs from Ceylon and south China to Burma, Sumatra and Java. It is abundant on the Karo Plateau in Sumatra, the male being seen flying along the roadside, while the female is confined to the forest. In flight, the latter sex closely resembles *Danaus chrysippus*, although the Danaid butterfly does not occur in Malaysia at this altitude. The larva feeds on *Viola*. There are one or two other butterflies which are common in Burma, Sumatra and Java and yet miss Malaya and Borneo, notably *Papilio paris* and *Acraea issoria* (Hübner) (= *vesta* Fabricius).

Vanessa Group of Genera

Larvae as in the *Cupha* group, but the branched spines are not so uniformly distributed: the head has a pair of long spiny processes in *Rhinopalpa*, *Toma*, *Hypolimnias*, *Doleschallia* and *Kallima*.

Rather a miscellaneous collection of genera. A submarginal series of spots or ocelli may be present on the hindwing beneath, and, often, the underside is marked with a cryptic pattern.

The group is cosmopolitan in distribution.

Key for the separation of the Genera of the VANESSA Group

- 1 (12) Eyes smooth.
- 2 (3) Palpi black above, white beneath. Head and thorax black, and each with a pair of white dots. Forewing only slightly falcate. Hindwing not tailed. *Hypolimnias*
- 3 Palpi not as above. Head and thorax not white spotted. Forewing markedly falcate (except in *Symbrenthia*).
- 4 (5) Hindwing not tailed. Hindwing with submarginal ocelli. *Precis*
- 5 Hindwing tailed or prominently toothed.
- 6 (9) Hindwing tailed or toothed at vein 4 or 5, but not at vein 1b. Underside not leaf-like.
- 7 (8) Hindwing toothed at vein 4. Cell slenderly closed. *Toma*
- 8 Hindwing tailed at vein 5. Cell open. *Rhinopalpa*
- 9 Hindwing tornus produced to form a tail at vein 1b, but without a tail at vein 4 or 5. Underside with a leaf-like pattern.
- 10 (11) Cell open. Upperside orange-brown with a black apical border on the forewing. *Doleschallia*
- 11 Cell slenderly closed. Upperside purple-blue with a broad, orange, subapical band on the forewing. *Kallima*
- 12 Eyes hairy.
- 13 (16) Forewing dorsum straight. Hindwing termen not excavated above vein 7.
- 14 (15) Hindwing with a short pointed tail at vein 4. Cell open. *Symbrenthia*
- 15 Hindwing not toothed or tailed at vein 4. Cell slenderly closed. *Vanessa*
- 16 Forewing dorsum excavated in the distal half. Hindwing termen excavated above vein 7. Hindwing with a spatulate tail at vein 4. *Polygonia*

Genus *Precis* Hübner

In the angled wings, the brightly coloured upperside and the more sombre under surface, this genus resembles *Vanessa*, but it differs in the smooth eyes and the more angulate wings. Sexes alike, except in *P. orithya*.

Some authors divide the genus into two subgenera:

- (a) *Junonia* Hübner, in which the submarginal ocelli in spaces 2 and 5 on the hindwing are much more prominent than the rest.
- (b) *Precis* Hübner, without enlarged ocelli in spaces 2 and 5 on the hindwing.

Only *P. iphita* and *P. hedonia* belong to the latter group.

The *Precis* species are peculiarly susceptible to seasonal variation, and in most parts of their range, they occur in both wet- and dry-season forms. In the latter, the wings are more sharply angled, and the underside has a cryptic pattern resembling a dead leaf and reduced post-discal ocelli. In Malaya proper, *Precis* individuals are almost invariably of the wet-season form, but in Kedawi dry-season forms occur during the drier months from December to February.

The larvae resemble those of *Vanessa*, being without spines on the

head, and feed on species of Acanthaceae. Representatives of the genus are found in every continent except Europe.

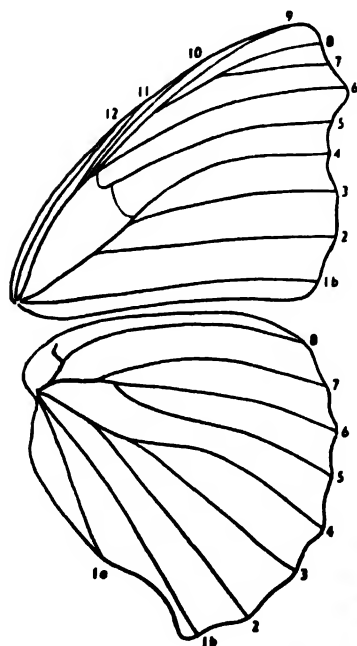


Fig. 62. *Precis allites* ♀. Venation.

- Key for the separation of the species of *Precis*
- 1 (2) Upperside forewing without an ocellus in space 2. *P. iphita*
 - 2 Upperside forewing with an ocellus in space 2.
 - 3 (6) Upperside forewing and hindwing with submarginal ocelli in all interspaces.
 - 4 (5) Upperside forewing and hindwing ocelli in spaces 2 and 5 not larger or more prominent than the rest. *P. hedonia*
 - 5 Upperside forewing and hindwing with the ocelli in spaces 2 and 5 larger than the rest and inwardly reddened. *P. allites*
 - 6 Upperside forewing and hindwing without submarginal ocelli in spaces 3 and 4.
 - 7 (8) Upperside forewing with a whitish subapical band. *P. orithya*
 - 8 Upperside forewing without a pale subapical band.
 - 9 (10) Upperside fulvous orange, and without pale yellow spots on the forewing. *P. almana*
 - 10 Upperside brown with pale yellow spots on the forewing. *P. lemonias*



Fig. 63. *Precis almana*. Larva.



Fig. 64. *Precis almana*. Pupa.

Precis iphita horsfieldi (Moore)

Plate 40, figure 96 ♂

The Chocolate Soldier

P. iphita is brown, with the wings traversed by several rather indistinct darker bands; the two narrow submarginal lines follow the wing contours. The forewing has two cell-spots, and the hindwing a series of indistinct brown, post-discal, ocelli. The underside has the markings less distinct, but a dark brown stripe which extends across the hindwing gives it a leaf-like appearance. In some individuals the hindwing has a white costal spot on the underside.

The larva is dull dark brown, and the food plant is *Strobilanthes*. The butterfly is fairly common in open country and on the forest edge throughout Malaya, and does not often ascend the hills. The species occurs from Ceylon to south China, and through Malaysia to the Lesser Sunda Islands.

P. hedonia ida (Cramer), which is found in Johore and Singapore Island, has the upperside more reddish brown than in *P. iphita*, and there

is a prominent series of reddish post-discal ocelli on the hindwing. It is represented in Tioman Island by the subspecies *seitzi* Corbet, characterised by the more macular discal band. The species occurs as far eastward as Australia and the Solomon Islands.

***Precis atlites atlites* (Linnaeus)**

Plate 40, figure 97 ♀

The Grey Pansy

The butterfly is pale greyish buff above, with dark brown irregular post-discal and submarginal lines. Both wings have a series of post-discal ocelli, some of which are outwardly blackened and inwardly coloured pink. The underside is much paler, and there is a tendency towards the obsolescence of the post-discal ocelli in the dry-season form which occurs, together with the usual wet-season form, in Kedawi during the winter months.

The larva is dull black with whitish longitudinal stripes, and the food plant is *Hygrophila*.

P. atlites is very common, and is found in the neighbourhood of villages and along forest roads ; occasionally, it is taken on the hills.

The species ranges from Ceylon to south China, and through Malaysia to Celebes and Lesser Sunda Islands.

P. lemonias lemonias (Linnaeus) is almost confined to the Langkawi Islands and north Kedah ; it still occurs in Penang but appears to be much rarer than formerly. Essentially, it is a secondary growth butterfly. It is nearest to *P. atlites*, but is dark brown above, with pale yellow spotting on the forewing, and a large prominent ocellus, ringed with orange-red, on each wing as in *P. almana*. The larva feeds on Acanthaceae, and the species is not found south of Penang (Genitalia, Plate 6, fig. 67).

***Precis almana javana* (C. Felder)**

Plate 40, figure 99 ♂

The Peacock Pansy

The adult is a rich fulvous brown above, with a darker edging to the distal margins. The forewing has four broad costal bars, of which the outer three are filled in with bluish black. Near the tornal angle of the forewing is a prominent, white-eyed, "peacock" spot, and a similar, but much larger, spot is situated in the apical area of the hindwing. The paler underside has additional ocelli. In the dry-season form, which occurs during the winter months in Kedawi, the wings are more sharply angled, and the underside more leaf-like in appearance.

The butterfly is not found on the hills but is very common in gardens and in open country on the plains throughout Malaya. The larva is

pale ochreous brown with blackish longitudinal stripes (fig. 63. It feeds on *Mimosa pudica* (Sensitive plant) and various species of Acanthaceae. The pupa is shown at fig. 64.

The distribution is similar to that of *P. allites*.

***Precis orithya wallacei* (Distant)**

Plate 40, figure 98 ♂ ; genitalia, Plate 6, figure 68

The Blue Pansy

In the male the forewing is black with a whitish, subapical band, post-discal ocelli in spaces 2 and 5, and two orange-red bars in the cell ; the hindwing is bright blue, with an orange-red subternal ocellus. The female is coloured with more sombre hues, and has two orange-red post-discal ocelli on the hindwing.

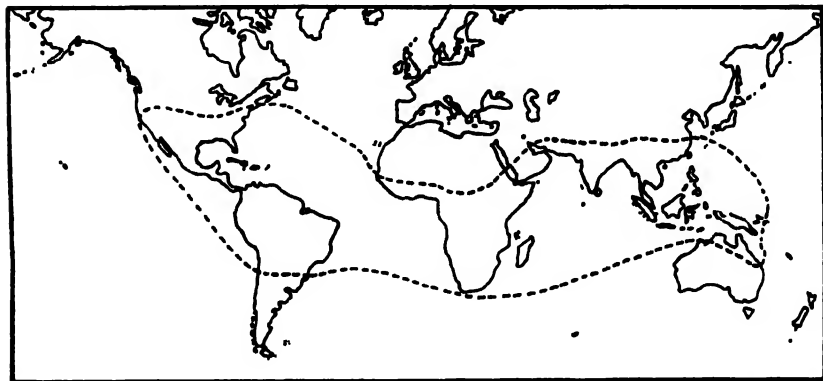


Fig. 65. Distribution of *Precis orithya*.

Apart from the migratory *Vanessa cardui*, *Precis orithya* is the only Nymphalid that has a long established circumtropical distribution. The male genitalia of the Oriental and American representatives are similar.

In Malaya the butterfly is rarely found much above sea level, and occurs on grassy patches on the roadside and in open country generally. Sometimes the male is common, but the female is rarely so.

The larva is shining black, shading into brown at the sides; the neck and tail are marked with orange, and there is a lateral row of orange spots. The food plant is *Hygrophila*.

The species is widely distributed, ranging, in the Oriental Region, from Ceylon and India, north to south China and Formosa, through Malaysia and the Archipelago to Australia. It is a common butterfly in the neighbourhood of Brastagi (4500 feet), in Sumatra, where it may be seen flying along the roadside in company with *Vanessa cardui*.

Genus *Vanessa* Fabricius

Adults rather large and brightly coloured with orange or red. Sexes alike and hard to separate as the fore-tarsi are clothed with long shaggy hair in both sexes.

Larvae solitary in habit and living concealed, or partly concealed, in a curled-up leaf on the food plant.

The genus is cosmopolitan in distribution.

Vanessa cardui cardui (Linnaeus)

Plate 40, figure 100 ♀; ♀ genitalia, Plate 6, figure 69

The Painted Lady

The "Painted Lady" is the most widely distributed butterfly in the world, owing doubtless to its strongly developed migratory habits. It occurs in all continents, but, in the tropical belt, it is largely confined to the hills.

The adult is almost too familiar to need description. The wings are salmon-pink on emergence, but they soon fade to ochreous brown, and, in addition to the black spots and markings on both wings, the black apical area of the forewing has two series of white spots. The butterfly has a habit of returning repeatedly to the same spot when disturbed, but it is not easily caught.

The larva is black with yellowish spines and markings. It feeds chiefly on *Carduus* (thistle) in Europe, but *Artemisia* and *Blumea* (both Compositae) are among the food plants in the Oriental Region.

The history of *V. cardui* in Malaya is of considerable interest. Until recently, the only Malayan records referred to a specimen found on Penang Hill in 1886, and a second example attributed to Singapore Island. At the same time, it has always been a common insect on the Battak Plateau, in north-east Sumatra, at altitudes above 3500 feet. Within the last decade, *V. cardui* has appeared at Cameron Highlands at elevations between 3500 and 5200 feet, and it is now a common butterfly in the gardens of the residents. Until the development of the Highlands in the early "thirties," there were no extensive areas of secondary growth above 3500 feet in Malaya, and insects with such requirements could do no more than maintain a precarious footing. Whether *V. cardui* has long been a rare resident in the Malayan hills, or whether it is a recent arrival from Sumatra is uncertain, although the latter explanation seems the more probable*.

Genus *Polygonia* Hübner

The adults are remarkable for the strongly angulate wings and, except for the single Malayan species, all have the upperside a rich orange-brown with numerous black spots, and the dark underside resembles a dead leaf.

* See Appendix, p. 494.

The larvae are shorter and stouter than in *Vanessa*. The genus is practically confined to the Palaearctic and Nearctic Regions, although a few species occur at the northern border of the Oriental Region and *P. canace* is found from India and Japan to Malaysia and the Philippines.

The beautiful *P. canace perakana* (Distant) (plate 40, figure 101 ♀) occurs on the Malayan hills, and rarely descends below 4,000 feet. The upperside is deep bluish black with a broad blue post-discal band traversing both wings; the underside is brownish black, with numerous lighter and darker striae, and shows the cryptic coloration which is common in the *Vanessa* group of genera. The butterfly prefers open spaces surrounded by forest, and likes to settle on flowers, or on the path, in bright sunshine, as does *Vanessa cardui*. The orange-yellow larva is ornamented with numerous black spots, and the food plant is *Smilax*.

Genus *Symbrenthia* Hübner

The butterflies are rather small, the upperside is black with orange-brown bands and the underside is richly variegated. Sexes alike.

The larvae resemble those of *Precis* and *Vanessa*, being without a long pair of cephalic spines, and the food plants are species of Urticaceae. Distributed from India and Palaearctic China, through the Archipelago, to New Guinea.

Key for the separation of the species of *SYMBRENTHIA*

- | | | |
|---|---|---------------------|
| 1 | (6) Underside pattern a network of reddish brown (<i>S. hippoclus</i> and <i>S. anna</i>) or crimson brown (<i>S. hypatia</i>) lines. | |
| 2 | (5) Underside with a straight dark reddish brown line from near the base of the hindwing to the middle of the termen on the forewing. | |
| 3 | (4) ♂ uncus cleft throughout its length. | <i>S. hippoclus</i> |
| 4 | ♂ uncus cleft for a short distance at the apical end. Underside hindwing pale lilac purple, post-discal area more heavily dark dusted and more prominently marked than in <i>S. hippoclus</i> . | <i>S. anna</i> |
| 5 | Underside without a straight continuous line across both wings. | <i>S. hypatia</i> |
| 6 | Underside markings comprising irregular black spots. | <i>S. hypselis</i> |

Symbrenthia hippoclus lucinus Fruhstorfer

The Common Jester

None of the Malayan species of *Symbrenthia* can be described as common. They are black above, with orange bands as in *Neptis miah*, but the short pointed tail on the hindwing separates them from all similar species of *Neptis*. The under surface of *Symbrenthia* is characteristic, and comprises a richly coloured variegated pattern on a buff or ochreous ground.

In *S. hippoclus* the underside is ochreous, marbled with reddish brown, and there is a prominent dark stripe extending from the mid-termen on the forewing to the mid-dorsum on the hindwing. The butterfly is found along sunlit forest paths at all elevations, and may be mistaken for an orange *Neptis* in flight.

The larva is dark brown, with black branched spines and dark,

oblique, lateral stripes, and is gregarious in habit; the food plants recorded are *Girardinia heterophylla* and *Debregeasia bicolor*, neither of which occurs in the Malay Peninsula.

S. hippoclus is widely distributed, ranging from India and China through the Archipelago to New Guinea and the Bismarcks. A closely allied species, *S. anna* Semper*, is known from the Large and Lesser Sunda Islands, the Philippines and Celebes, and it is represented by *S. anna selangorana* Corbet in Malaya. In general, it differs from *S. hippoclus* in the reduced orange markings on the upperside, the darker and more heavily marked under surface, and, invariably, in that the uncus is not deeply cleft for the greater part of its length as in that species. In Malaya, however, the two species are almost identical in appearance in the male. Curiously enough, only *S. anna* is known from Paramalaya and from Palawan and Bazilan.

In *S. hypatia chersonesia* Fruhstorfer (plate 40, figure 102 ♂) the underside is pale buff and has a more marbled appearance, and a diffuse dark band runs from the disc of the forewing to the mid-dorsum on the hindwing. *S. hypselis sinis* Nicéville is easily recognised by the heavy black spotting on the pale yellowish underside. *S. hypatia* is confined to the hills in Malaya, while *S. hypselis* is found at moderate elevations. The former species is Malaysian, but *S. hypselis* is distributed from China and Burma southwards throughout Malaysia.

Genus *Rhinopalpa* C. and R. Felder

The wing shape recalls that of *Polygonia*, except that the hindwing is tailed at vein 5. The palpi are long and densely covered with scales.

The single species is found from Burma, through Malaysia, to the Philippines and Celebes.

Rhinopalpa polynice eudoxia (Guérin-Ménéville)

Plate 40, figure 103 ♂

The Wizard

The wings are rich orange brown above, with broad black distal margins, and a series of black submarginal spots on the hindwing. The under surface is dark purple-brown, and the wings are traversed by fine sinuate silvery blue lines, and each wing has a full series of submarginal ocelli. The female is larger and paler on both surfaces than the male. The curiously angled wing contours readily separate this butterfly from any other Malayan species.

The butterfly is rather uncommon, the female more so than the male, and is found in well wooded localities at all usual elevations.

It is stated that the larva resembles that of *Vindula*, and the food plant is *Conocephalus suaveolens*.

* Sometimes known by the name *hippocla* (Hübner, 1828), a homonym of *hippoclus* (Cramer, 1779), and therefore invalid.

Genus *Yoma* Doherty

Structurally rather similar to *Rhinopalpa*. Sexes alike.

It seems probable that there is a single species of *Yoma* occurring from Burma eastwards to Australia and the Solomon Islands. *Y. sabina vasuki* Doherty is known from the Langkawi Islands, but it has not yet been found elsewhere in Malaya. The upperside is dark brown with a broad orange-yellow discal band. The larva resembles that of *Doleschallia*.

Genus *Hypolimnias* Hübner

The three Malayan species are velvety black above, shot with purple, and, in two species, the sexes are dissimilar. The female of the widely distributed *H. bolina* is one of the most variable butterflies in the world, and *H. misippus*, which occurs in Asia, Africa and America, is remarkable for its mimetic female.

The larvae are gregarious, and the food plants comprise species of *Acanthaceae* and *Portulaca*.

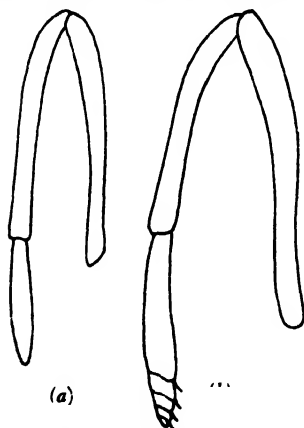


Fig. 66. *Hypolimnias misippus*.
(a) Male. (b) Female fore-leg.

Key for the separation of the species of *HYPOLIMNAS*

- 1 (2) Underside hindwing with a prominent black costal spot in the middle of space 7. *H. misippus*
- 2 Underside hindwing without a black costal spot.
- 3 (4) Underside hindwing with a single white post-discal spot in space 7. *H. bolina*
- 4 Underside hindwing with two white post-discal spots in space 7, the second one placed between the large spot near the middle of space 7 and that in space 6. *H. antilope*

Hypolimnias antilope anomala (Wallace)

Plate 41, figure 105♂

The Malayan Egg-fly

This, the commonest Malayan species of *Hypolimnias*, might pass as a mimic of a species of *Euploea*, but it can hardly be regarded as a good one. As usual with mimetic species, however, it is subject to considerable variation.

The butterfly is dark brown, with a slight blue gloss on the upper surface. In addition to a submarginal series of whitish dots, there is a full series of white post-discal spots on both wings. In form *nivas* Fruhstorfer, the hindwing has a diffuse white post-discal band.

H. antilope is found in fairly open forest, and does not ascend much above 1000 feet; usually, it is common where it occurs.

The spiny larva resembles that of the English Small Tortoiseshell

(*Aglais urticae* (Linnaeus)) in a general way, but has two branched spines on the head. It feeds on species of Urticaceae, is gregarious, and makes no attempt at concealment. The pupa recalls that of a European *Vanessa*.

H. antilope is distributed from the Nicobar Islands and Malaysia to New Guinea and the Bismarck Archipelago.

Hypolimnas bolina bolina (Linnaeus)

Plate 26, females; Plate 41, figure 104 ♂; genitalia, Plate 6, figure 71

The Great Egg-fly

The male of *H. bolina* is deep purple-blue above, with a large white discal area, faintly tinged with purple, on each wing; there is a similar but smaller white area near the apex of the forewing. The female is larger and has been found in the Peninsula in two major forms, and the occurrence of these two is of unusual interest.

In the female of subspecies *incommoda* Butler the upperside is dark bluish black, with a whitish submarginal fascia, which is broader and more clearly defined on the hindwing, and internal to which is a series of white spots. In some individuals there is a white or bluish white subapical fascia on the forewing.

The earliest recorded Malayan specimens of *H. bolina* are those taken by Pinwill previous to 1877 in Penang and Malacca; Distant obtained the species in Kedah and Province Wellesley a few years later. Since then odd specimens have been collected (we have examined individuals from Perak and Singapore), but, as far as we are aware, *H. bolina* was not seen in the Peninsula during the first thirty years of the century. All the female specimens taken in Malaya during the last century are referable to the *incommoda* form, and are, indeed, indistinguishable from the representative of the species in south Burma. The apparently extinct Malayan form of *H. bolina*, which occurred in the Peninsula during the latter part of the XIXth Century, should therefore be known as *H. bolina incommoda* Butler. In September, 1932, Corbet found *H. bolina incommoda* to be one of the commonest butterflies in and around Rangoon.

H. bolina appears to be rare in Sumatra, and we have seen no specimens recently caught, but all the old female examples of the species from Sumatra, Nias and Pulau Tello, in the Batu Islands, appear to be of the *incommoda* form.

In 1934 and during the following years, *H. bolina* was taken in Perak and Province Wellesley again, and in 1936 it was taken in the neighbourhood of Kuala Lumpur; by 1939 it had become common on Singapore Island. Apart from a Province Wellesley specimen, which may be referable to form *incommoda*, all the females obtained in Malaya in the "thirties" and onwards are not the Burmese form but resemble

that sex from Java, where the typical female form is known as *iphigenia* (Cramer). In this form the wings are black, the forewing has a white subapical fascia, a larger white post-discal fascia, and a large orange patch along the dorsal margin, and the hindwing has a large white discal patch with the edges blue-dusted. In males corresponding to the orange-dusted females, the forewing beneath has the cell coloured a deep rich ferruginous, and the white spots against the upper margin of the cell are large and broadly black bordered. It seems clear that, in recent years, Malaya has been colonised by *H. bolina* from Java, and the present representatives of the species in the Peninsula must be known as *H. bolina bolina* (Linnaeus).

As in the subspecies *incommoda*, the new Malayan form shows considerable variability in the female, although most specimens are referable to ♀-f. *iphigenia*. In ♀-f. *aphrodite* Fruhstorfer (= *semiramis* Wildey),

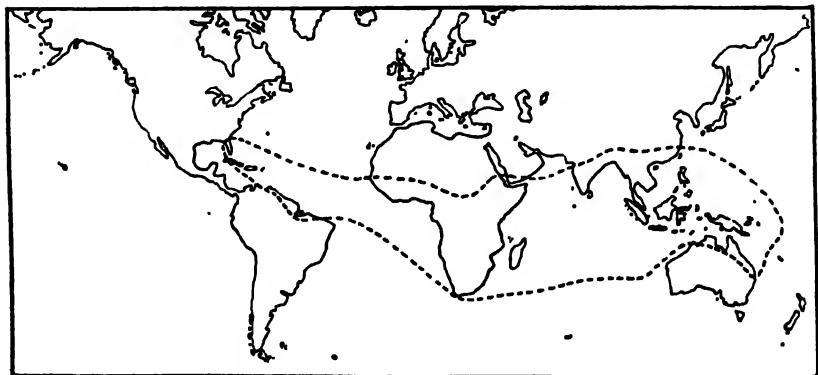


Fig. 67. Distribution of *Hypolimnas misippus*.

American *Hypolimnas misippus* are indistinguishable from those found in Africa, and it is believed that the species reached the New World in the old slave ships which first sailed between the West Indies and Africa nearly 400 years ago.

the forewing post-discal band is blue, and the pale patch on the hindwing is obsolete. In the unique ♀-f. or ♀-ab. *iris* Wildey, the wings are velvety black, and the forewing white band and the hindwing white discal patch are washed with pale pink (Wildey, 1941).

H. bolina is strong on the wing, flying high, and taking part in migratory flights. Where it occurs, it flies in gardens, in secondary growth, and on the forest edge, and may be taken at flowers. It is essentially an insect of the plains.

The larva is dark brown, with the head paler, and the spines are orange-yellow. The usual food plants are species of *Acanthaceae*.

H. bolina is widely distributed throughout the Indo-Australian Region and has even reached Madagascar. It has been described as the most variable butterfly in the world.

The male of *H. misippus misippus* (Linnaeus) resembles that sex of *H. bolina*, but there is present on the hindwing beneath a black costal spot which is absent from the latter species (genitalia, Plate 6, fig. 70). The female of *H. misippus* is an almost exact replica of *Danaus chrysippus*, and closely resembles that species in flight. Like *H. bolina*, *H. misippus* is confined to secondary plant association on the plains in Malaya (it appears to be least uncommon in Kedawi), but it occurs on the hills in Sumatra and Java. It is distributed from Ceylon to China and throughout the Archipelago. It occurs also in Africa, in the West Indies and neighbouring parts of the American mainland, and it is believed that it reached the New World in the old slave ships from Africa. The larval food plant is *Portulaca oleracea*.

Genus *Doleschallia* C. Felder

Distributed from Ceylon, through the Archipelago, to Australia, the Bismarck Archipelago and Solomon Islands. One Malayan species.

Doleschallia bisaltide pratipa C. and R. Felder

Plate 41, figure 106 ♂

The Autumn Leaf

The butterfly is a rich orange-brown above, with the apex of the forewing broadly blackened, and an irregular black spot or streak at the cell-end which, in most individuals, reaches the black distal margin. The greyish brown underside is variegated, and marked with a leaf-like pattern. The tornus of the hindwing is produced to a tail, and when the butterfly is at rest with closed wings it closely resembles a leaf. The female is paler than the male, and the costal half of the forewing is yellower. In the Langkawi race, *siamensis* Fruhstorfer, the underside has the ground colour decidedly more ochreous.

D. bisaltide frequents moist and rocky localities in clearings in the forest, and is usually in evidence at quarries on forest roads. It is a common insect in Malaya, and is found at all elevations up to about 4,000 feet. The larva is black, with two rows of white dorsal spots, and with the head and spines steely blue. It is gregarious, and feeds on *Graptophyllum pectum*, *Artocarpus heterophyllus* (jak fruit) and, in other parts of its range, on *Pseuderanthemum malabaricum*.

D. bisaltide is widely distributed in the Indo-Australian Region; it occurs from Ceylon and India through the Malay Archipelago to Australia and the Bismarcks, but it has not yet been reported from New Guinea.

Genus *Kallima* Doubleday

Structurally rather similar to *Doleschallia* but the forewing apex is more pointed. The male genitalia are remarkable for the elongate,

furcate process, arising from the vinculum, which serves as a guide for the very long, slender, sickle-shaped aedeagus.

Kallima is represented from Ceylon to central China and Malaysia.

***Kallima paralekta amplirufa* Fruhstorfer**

Plate 43, figure 135 ♂; genitalia, Plate 6, figure 72

The Indian Leaf

The true Leaf Butterfly, *Kallima paralekta*, of which the habits were described by Wallace in *The Malay Archipelago*, is local in the Malay Peninsula and confined to heavy forest at moderate elevations. The upper surface of the wings is a rich purple-blue, with a broad, orange, subapical band on the forewing, and the reddish brown underside closely resembles a dead leaf. The female is larger and paler. When in flight, or at rest with open wings, the butterfly is conspicuous, but, when disturbed, it darts off and settles again with closed wings, in which position it may be difficult to distinguish from a dead leaf. It may be captured by use of fruit bait.

Although a comparative rarity in Malaya, *Kallima* is common in some parts of its range, which extends from Ceylon to central China and Malaysia.

The larva is brown, with long, red, branched spines, and the head and legs are black. The food plants are *Strobilanthes callosus* and *Pseuderanthemum malabaricum*.

Cyrestis Group of Genera

Larvae slender, cylindrical and smooth, with a pair of long curved filamentous processes on the head and single sword-shaped processes on the 2nd and 8th abdominal segments, the former curved backwards and the latter slightly forwards, and both serrated on the posterior edge. Pupae, elongate and angulate.

The butterflies are rather delicate, with transverse lines and stripes running across the wings.

Key for the separation of the genera of the CYRESTIS group

- | | | | |
|---|---|---------------------|--------------------|
| 1 | (2) Forewing with vein 10 arising directly from the cell. | Wings white. | <i>Cyrestis</i> |
| 2 | Forewing with vein 10 arising from vein 7 (fig. 68). | Wings orange-brown. | <i>Chersonesia</i> |

Genus *Cyrestis* Boisduval

The butterflies are easily recognised by the dark, narrow, transverse lines crossing the wings, and this feature has earned for them the name of "Map-wing" butterflies. The sexes are alike, and the rare females are difficult to differentiate. One species, *C. cocles*, is dimorphic in both sexes.

Although the life-history of no Malayan species of *Cyrestis* is known, the larvae of other species have been found feeding on *Delima sarmentosa* and *Ficus*.

The genus is represented from India eastwards through the Malay Archipelago to the Solomon Islands; one species occurs as far north as Japan.

Key for the separation of the species of CYRESTIS

- | | | |
|---|--|--------------------|
| 1 | (2) Forewing apex broadly truncate. | <i>C. themire</i> |
| 2 | Forewing apex not truncate. | |
| 3 | (4) Hindwing apex rounded, and the termen not excavated between veins 7 and 8. Basal halves of wings crossed by numerous narrow greyish brown or ochreous bands. | <i>C. cocles</i> |
| 4 | Hindwing apex angled, and the termen excavated between veins 7 and 8. Basal halves of wings crossed by very narrow black lines. | <i>C. nivea</i> |
| 5 | (6) Upperside forewing black transverse lines hardly broader at the costa than on the rest of the wing. | <i>C. nivea</i> |
| 6 | Upperside forewing black transverse lines much broadened at the costa. | <i>C. maenalis</i> |

Cyrestis nivea nivalis (C. and R. Felder)

Plate 41, figure 107 ♂

The Straight Line Map-wing

C. nivea is the most abundant of the Malayan species of "Map-wings," although none can be described as very common. *C. nivea* has the wings white, with the black markings as shown in the figure, and the tornal angle of both wings broadly shaded with orange. In the rather similar *C. maenalis martini* Hartert the black markings are broader, those on the costa of the forewing being especially prominent. In the smallest species of the genus, *C. themire themire* Honrath (formerly known by the preoccupied name of *C. perianther* (Fabricius)), the wings are crossed by narrow orange-brown stripes, and broadly bordered with blackish grey. *C. cocles earli* Distant has the ground colour white, or yellowish white, and the wing bases are broadly marked with greyish brown (form *earli* Distant) or ochreous (form *formosa* C. & R. Felder) stripes. There is no difference between the male genitalia of the two forms of *C. cocles*.

The flight is gliding. The males are found settled with flattened wings on moist spots on forest paths, and the females are confined to the shade of the forest.

The distribution of the genus in the Malay Peninsula is interesting. *C. nivea* may be taken at moderate elevations, and probably does not occur much above 2,000 ft. Above this altitude it is replaced by *C. maenalis*. Generally, adults of these two species are taken in ones and twos. *C. themire* is very local, but often abundant where it occurs; it remains in the same localities year after year, and prefers heavy forest from sea-level to about 3,000 feet. It is a common butterfly on Pulau Tioman, where it is represented by the race *robinsoni* Pendlebury, which has the wing bases heavily grey dusted, and a larger and darker race, *siamensis* Fruhstorfer, occurs on the Perhentian Islands, off the north coast of Trengganu. The rarest member of the genus is the very local *C. cocles*, which is found in open spaces in the vicinity of forest streams and quarries; occasionally, it appears in some numbers, but it is always confined to a few favoured localities (genitalia, Plate 6, fig. 73).

C. nivea and *C. themire* are distributed from Burma to Malaysia and the Lesser Sunda Islands, although the latter species appears to be absent from Borneo, Nias and certain of the Lesser Sundas. *C. maenalis* has much the same distribution, but reaches the Philippines and is absent from Java. *C. cocles* ranges from India, through Malaysia to the Philippines, Celebes and the Moluccas.

Genus *Chersonesia* Distant

The species differ from *Cyrestis* as stated above, and in the smaller size and shorter palpi. The female is paler than the male, rather larger, and with more rounded forewings.

The larva of one species has been found on *Ficus*. The genus occurs from India and Indo-China to Malaysia and the Philippines.

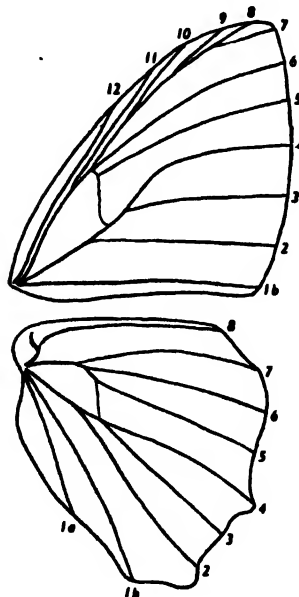


Fig. 68. *Chersonesia risa* ♂. Venation.



Fig. 69. *Chersonesia rahria*. Larva.



Fig. 70. *Chersonesia rahria*. Pupa.

Key for the separation of the species of *CHERSONESIA*

- (4) Upperside forewing third transverse stripe from the base single. Hindwing caudate at vein 4.
- (3) Upperside forewing inner submarginal line (that is, the 6th line from the base) quite straight and parallel to the termen. *C. risa*
 Upperside forewing inner submarginal line sinuous and curved towards the base at the costa. *C. rahria*
 Upperside forewing third transverse stripe from the base double. Hindwing only slightly angled at vein 4.
- 5 (6) Upperside forewing stripes about half as wide as the interspaces; the third stripe (from the base) strongly bent and meeting the costa at right angles. *C. intermedia*
- 6 Upperside forewing stripes nearly as wide as the interspaces; the third stripe more or less parallel to the second stripe. *C. parva*

Chersonesia rahria rahria (Moore)*Plate 41, figure 108 ♂***The Wavy Maplet**

C. rahria is orange-brown above with two reddish brown sub-basal bands, followed by a single dark brown line which is shaded with reddish brown; the hindwing has a small tooth at vein 4. The similar but much rarer *C. risa cyaneae* (Nicéville) differs from *C. rahria* in that the reddish brown submarginal band on the hindwing has a continuous black line and runs more or less straight from the apex to the costa; in the commoner species (*C. rahria* and *C. peraka*) this submarginal band is uniformly curved, parallel to the termen, and is marked with a series of separate black dashes. There is considerable variation in size in *C. rahria*, but usually it is smaller than *C. risa*.

C. rahria is a common and widespread species on the forested plains in Malaya, although, usually, only single individuals are seen; the subspecies *tiomana* Pendlebury, with more brightly coloured wings, flies on Pulau Tioman. *C. risa* prefers higher elevations, and is most often taken on the hills. *C. rahria* is distributed from Burma to Malaysia and the Philippines, while *C. risa* is found from North India to Neomalaya. The larva of *C. rahria* is green, with oblique dorsal stripes, and has the cephalic and segmental processes usual in the *Cyrestis* group.

C. peraka peraka Distant has three reddish brown sub-basal stripes on both wings, and the hindwing is not toothed. It is not uncommon in primary forest on the plains, but becomes rarer as the hills are ascended. *C. intermedia* Martin, which is confined to Neomalaya, and is intermediate between *C. rahria* and *C. peraka*, is figured for the first time on Plate 41, figure 109 ♂.

The *Chersonesia* species are forest butterflies of rather feeble flight; they settle with outspread wings like *Cyrestis*.

Limenitis Group of Genera

Larvae cylindrical, with branched spines, of which those on the thoracic segments may be longer than the rest; the head without horns, but armed with short spines in *Parathyma*, *Limenitis* and *Moduza*, and with a pair of short points in *Neptis*.

The facies of the adults are sufficiently characteristic for there to be little or no difficulty as regards generic determination, but it is more difficult to justify such separation on structural grounds; indeed, there is considerable diversity in structure among the species comprising the genera *Neptis* and *Parathyma*. As far as is known, the structure of the larvae accords with the usual generic separation.

Distributed in all continents and in both temperate and tropical zones.

Key for the separation of genera of the LIMENITIS group

- 1 (2) Hindwing vein 8 to the costa (fig. 71). Palpi hairy beneath. Forewing with a white, orange or tawny brown longitudinal cell streak. *Neptis*
- 2 Hindwing vein 8 reaches the termen (fig. 72). Palpi smooth (except in *Limenitis*).
- 3 (8) Eyes smooth (except in *Parathyma ranga* and *P. abiasa*). Palpi smooth.
- 4 (5) Underside forewing with a white longitudinal cell streak (orange or tawny brown in some females) which is usually present also on the upperside. *Parathyma*
- 5 Underside forewing without a pale longitudinal cell streak.
- 6 (7) Wings orange with dark brown transverse fasciae. *Pandita*
- 7 Upperside dark reddish brown with a broad, white, macular, discal band on both wings. *Moduca*
- 8 Eyes hairy. Palpi hairy beneath. Upperside brown with a pale green discal band on both wings. *Limenitis*

Genus *Neptis* Fabricius

The eyes are smooth; on both wings the cells are open and, on the forewing, vein 10 arises from the cell, except in the four orange and black species in the *hordonia* group. Formerly, this section was separated as the genus *Rahinda* Moore but an older name is *Pantoporia* Hübner, of which the type species is *N. hordonia*.

The male has a greyish speculum in the costal area on the hindwing above, and there is a corresponding nacreous area on the dorsum on the forewing beneath. In wing shape and markings the sexes are similar.

The butterflies are sun lovers, rather weak in flight, and the commoner species prefer open country.

The larvae are smooth, coloured pale brown or green, with two short apical points on the head, and with paired spiny processes on the IIrd and IIIrd thoracic and 2nd and 8th abdominal segments.

A wide variety of food plants is favoured.

Distributed from south and east Europe to Africa, China, Japan and throughout the Indo-Australian Region.

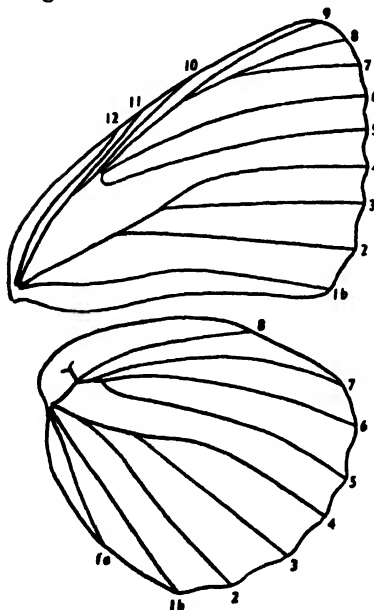


Fig. 71. *Neptis hylas* ♂. Venation.

Key for the separation of the species of NEPTIS

- 1 (8) Forewing vein 10 arising from vein 7. Upperside markings orange (*hordonia* group)
- 2 (3) Underside costal areas striated with reddish brown. Upperside forewing with one narrow orange submarginal line on the black border. *N. hordonia*
- 3 Underside costal areas not striated.
- 4 (7) Upperside forewing with two pale narrow submarginal lines, and one or both bent in space 3.
- 5 (6) Upperside forewing with the narrow submarginal lines orange and both bent in space 3. *N. peraka*

- 6 Upperside forewing with the narrow submarginal lines bluish grey and the inner one bent in space 3. *N. dindiga*
- 7 Upperside forewing with a single orange submarginal line broader than in the other species and not bent in space 3. *N. aurelia*
- 8 Forewing vein 10 arising from the cell. Upperside markings white, orange or tawny brown. (*hylas* group)
- 9 (26) Upperside black with white spots and stripes.
- 10 (25) Upperside cell streak divided into a basal streak and a triangular spot beyond.
- 11 (20) Upperside forewing post-discal spots in spaces 2 and 3 with their centres not in line with the spot in space 5.
- 12 (13) Underside hindwing white median band does not reach the costa. *N. nata*
- 13 Underside hindwing white median band reaches the costa.
- 14 (15) Underside forewing white submarginal spots in spaces 6 to 8 moved inwards out of line with the lower portion of the white submarginal fascia. Underside reddish brown, with the markings contrasted. *N. yerburii*
- 15 Underside forewing white submarginal spots in spaces 6 to 8 not out of line with the lower portion of the white submarginal fascia. Underside colouring more uniform.
- 16 (17) Underside rich golden brown with the white markings outlined in black. *N. hylas*
- 17 Underside with the white markings not outlined in black.
- 18 (19) Upperside white markings narrow. Underside forewing white post-discal spot in space 5 distinctly separated from the spots above. Upperside forewing cell stripe well separated from the streak beyond. Underside rather dark reddish brown. *N. soma*
- 19 Upperside white markings usual width. Underside forewing white post-discal spot in space 5 conjoined, or almost conjoined, with the spots above. Upperside forewing cell stripe almost continuous with the streak beyond. Underside pale reddish brown with a slight ochreous hue. *N. nandina*
- 20 Upperside forewing post-discal spots in spaces 2, 3 and 5 with their centres in line. Underside hindwing white median band not to costa.
- 21 (22) Underside hindwing without a white streak across the base of the cell. *N. magadha*
- 22 Underside hindwing with a white streak across the base of the cell.
- 23 (24) Underside hindwing with the narrow greyish line between the two white bands almost straight from vein 7 to the mid-dorsum. Hindwing vein 8 short as usual, and not reaching the white submarginal line on the underside. *N. durjodana*
- 24 Underside hindwing with the narrow whitish line between the two white bands strongly incurved near the costal margin. Hindwing vein 8 long and reaching the white submarginal line on the underside. *N. columella*
- 25 Upperside forewing cell streak and spot beyond conjoined.
- 26 Upperside not black with white spots and stripes. *N. sankara*
- 27 (30) Upperside black with broad orange stripes.
- 28 (29) Upperside forewing with two orange submarginal lines on the black distal margin, the outer line narrow and obscure, and the inner one with its proximal edge crenulate. Underside not purple-washed. *N. heliodora*
- 29 Upperside forewing with a single very narrow uniform orange submarginal line. Upperside purple-washed. *N. mish*
- 30 Upperside dark brown with diffuse tawny stripes.
- 31 (32) Underside dark brown with clearly defined ochreous buff spots and bands. *N. ebusa*
- 32 Underside not so.
- 33 (34) Underside greyish brown with the white spots and bands sullied and faintly pink-washed. *N. vikasi*
- 34 Underside rich purple-brown with the whitish spots and bands purple-washed. *N. anjana*

Neptis hordonia hordonia (Stoll)

Plate 41, figure 110 ♂

The Common Lascar

The wings are black above, with prominent orange bands as shown in the figure. The under surface is orange-yellow with reddish brown bands. *N. hordonia* and *N. paraka paraka* Butler are very similar in appearance, but they can be separated in that the first-named species has a single narrow orange line on the black marginal border on the forewing while *N. paraka* has two such lines.

Both butterflies are found in forest pathways at moderate elevations. *N. hordonia* is common, but *N. paraka* is of less frequent occurrence.

The larva of *N. hordonia* is greenish grey, crossed by dark, oblique, lateral bands, and is remarkable in that it occurs in two forms, according to Davidson, Bell and Aitken (1896), who have bred the species in India. In one larval form, which gives rise to butterflies with a dark "male mark" and feeds on both *Acacia* and *Albizia*, the head is roughly triangular, and there is a pair of obtuse dorsal points on the IIrd and IIIrd thoracic and 2nd and 8th abdominal segments. The second larval form feeds only on *Acacia*, gives rise to butterflies with a light "male mark," and has the head furcate, and the dorsal points on the segments replaced by long spinous processes*.

N. hordonia is distributed from Ceylon and India, through Malaysia, to the Lesser Sunda Islands.

***Neptis hylas mamaja* Butler**

Plate 41, figures 112 and 113 ♂

The Common Sailor

N. hylas is by far the most abundant member of the genus, and it occurs in all types of country in the Malay Peninsula, although becoming perceptibly scarcer as the hills are ascended. The wings are black and white above, and, in this species only, the underside is a rich golden brown.

The larva is pale green, and the IIrd and IIIrd thoracic and 2nd and 8th abdominal segments are armed with a subdorsal pair of short, fleshy, spinous processes, of which those on the IIIrd segment are the longest, and all are tipped pale pinkish. The various food plants known are mostly in the families Leguminosae, Malvaceae and Tiliaceae*.

N. hylas has a very extensive range, being distributed from Germany eastwards to Japan, and from Ceylon through the Archipelago to Celebes.

Among the other black and white species of *Neptis* of the size of *N. hylas*, those most likely to be met with are *N. nata cresina* Fruhstorfer, *N. duryodana nesia* Fruhstorfer, and *N. soma gononata* Butler as they are generally distributed in forest country at lower elevations. In *N. nata* and *N. duryodana*, the white median band on the underside of the hindwing does not reach the costa, and, of these three species, in *N. duryodana* only are the post-discal spots in spaces 2, 3 and 5 on the forewing placed with their centres in line.

N. nandina leuconata Butler and the much rarer *N. yerburii pendleburyi* Corbet are confined to the hills and are liable to be confused with *N. soma*, although this latter species has narrower white markings on the upperside.

Of the larger species, *N. columella singa* (Fruhstorfer) is commoner in Kedawi and prefers secondary growth, while *N. magadha charon* Butler

* See Appendix, p. 494.

appears to be restricted to Malaya proper and is a true forest insect. In *N. columella* there is a white streak across the base of the cell on the underside of the hindwing which is absent from *N. magadha*. The larva of *N. columella* has been reared on *Pterocarpus indicus* in Malaya.

***Neptis heliodore dorelia* Butler**

Plate 41, figure 111 ♀; genitalia, Plate 6, figure 74

The Burmese Lascar

This butterfly can be immediately separated from the similar species in the *N. hordonia* group as vein 10 on the forewing arises directly from the cell and not from vein 7. The upperside is black with broad orange bands arranged in the usual manner in this genus, and the ground colour beneath is orange-yellow with greyish black bands.

The life history is unknown, and the species occurs from Assam and Burma to Malaysia.

Another orange and black *Neptis* found in Malaya is *N. miah sarchoea* (Fruhstorfer), which is about the same size as *N. hylas* and heavily suffused with purple below. Although it occurs at lower elevations, it is most frequently taken on the forested hills.

Of the dark brown species, *N. vikasi omeroda* Moore is widely distributed throughout the Peninsula at all usual elevations, but it is never common. It is one of a small group of species which frequent secondary growth in Kedawi, although practically restricted to primary forest in Malaya proper. In *N. vikasi*, the underside is dull greyish brown with sullied markings; in the rarer *N. anjana hyria* Fruhstorfer which is confined to the hills, the underside is purple-brown with more prominent purplish white markings.

Genus *Parathyma* Moore

The adults are usually larger, stouter and the wings broader, longer and more pointed than in *Neptis*; in colouring and habits, the species of the two genera are similar, but the *Parathyma* forms are stronger on the wing. Usually, the sexes are alike but they are dissimilar in three or four species, and the female is dimorphic in *P. nefte*.

The larvae are usually, if not invariably, green, the head is armed

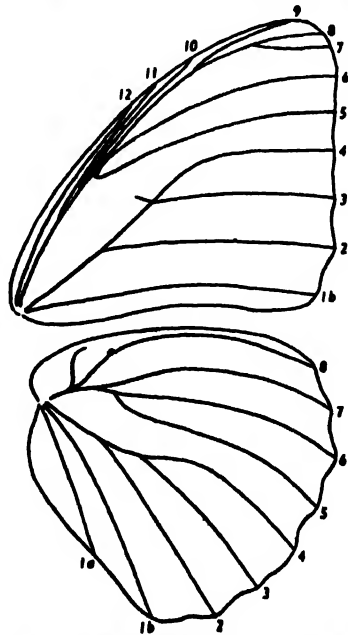


Fig. 72. *Parathyma perius* ♂. Venation.

with short spines, and each segment has a pair of finely branched spines. Distribution more restricted than in *Neptis*, representatives occurring from Ceylon and India to palaearctic China, and through the Eastern Archipelago to the Solomon Islands, although absent from New Guinea and Australia.

Key for the separation of the species of *PARATHYMA*

- 1 (8) Forewing cell open. Eyes smooth.
- 2 (3) Upperside forewing white cell-streak entire and unbroken, and no spot beyond. *P. pravara*
- 3 Upperside forewing white cell-streak with one or more spots beyond.
- 4 (7) Upperside forewing with a white post-discal spot in space 3.
- 5 (6) Upperside forewing white cell-streak divided into four portions. *P. perius*
- 6 Upperside forewing white cell-streak with a detached spot beyond. *P. asura*
- 7 Upperside forewing without a white post-discal spot in space 3. *P. larymna*
- 8 Forewing cell slenderly closed.
- 9 (12) Eyes hairy.
- 10 (11) Upperside forewing without a clearly defined cell-streak, but with rather obscure whitish spots in the distal half of the cell. Upperside forewing with two submarginal series of diffuse white spots. *P. ranga*
- 11 Upperside forewing cell-streak clearly defined, and followed by a large white spot at the end of the cell. Upperside forewing with a very narrow and obscure greyish submarginal line and an inner series of narrow, white, submarginal stripes. *P. abiasa*
- 12 Eyes smooth.
- 13 (16) Upperside forewing white post-discal spot in space 2 well separated from the spot in space 1b; no post-discal spot in space 3. Sexes alike.
- 14 (15) Upperside forewing cell-streak entire and separated from the spot beyond. *P. kanwa*
- 15 Upperside forewing cell-streak twice constricted and well separated from the spot beyond. *P. rela*
- 16 Upperside forewing white post-discal spots from dorsum to space 2 and 3 conjoined or contiguous. Sexes dissimilar.
- 17 (18) ♂ upperside forewing with a white post-discal spot in space 3. ♀ upperside black with white markings; white post-discal spots in spaces 1b, 2 and 3 with their centres in line. *P. selenophora*
- 18 ♂ upperside forewing no white spot in space 3. ♀ upperside black or dark brown, with orange or dull brown stripes.
- 19 (20) Upperside forewing with the post-discal spot in space 4 comparatively small, and with its inner edge moved out of line with the spots in spaces 5 and 6. ♂ upperside forewing subapical spot in space 6 orange. *P. coma*
- 20 Upperside forewing with the post-discal spots in spaces 4, 5 and 6 confluent and with their inner edges in line. ♂ upperside forewing subapical spot in space 6 usually white. *P. nefie*

Parathyma pravara helma (Fruhstorfer)

Plate 41, figure 114 ♂

The Lance Sergeant

This species is black above, with an interrupted, white, macular, curved fascia running from mid-costa on the forewing to near the base of the dorsum on the hindwing. There are white submarginal stripes on both wings, that on the hindwing taking the form of a broad band running from the apex to the dorsum. *P. pravara* differs from other similar Malayan species of the genus in that the cell-streak in the forewing is entire and clavate at its distal end. The underside is greyish brown with markings as on the upperside.

P. pravara is one of the most abundant species of *Parathyma* in the Malay Peninsula, and occurs at all elevations up to about 4,000 feet in forest country.

The species is confined to Burma, Indo-China and Malaysia.

Parathyma perius perius* (Linnaeus)Plate 41, figure 115 ♂ and Plate 42, figure 116 ♂***The Common Sergeant**

The wings above are black, with white markings as usual in the genus. The white cell-streak on the forewing above is divided into four portions, and the white spots comprising the post-discal band on the hindwing are widely separated. The under surface is distinctive in the orange-brown ground colour, and in that the white post-discal fascia on the hindwing has a proximal series of black spots.

The butterfly is rather erratic in occurrence, but at times it may be common. It is found in secondary growth and in open forest on the plains, and is usually taken at flowers.

The yellowish green larva has the head, legs and branched spines deep reddish brown, and it has been found on species of Euphorbiaceae, such as *Glochidion* and *Phyllanthus*.

The species ranges from Formosa, China and India through Malaysia to the Lesser Sunda Islands.

Parathyma nefte subrata* (Moore)Plate 42, figure 117 ♂, 118 ♀; genitalia, Plate 6, figure 75***The Colour Sergeant**

In this species the sexes differ considerably, and the female occurs in two quite distinct forms. The male is a rich velvety black, with the white markings tinged with bluish. In the ♀-form *neftina* (Fruhstorfer) the wings are marked with broad orange-brown stripes arranged in the usual manner. The ♀-form *subrata* (Moore) is a dark dull chocolate brown, with narrow and rather diffuse tawny brown markings. The ♀-f. *neftina* appears to be the commoner, but both female forms are more abundant than the male. It would be an interesting experiment to breed the species and obtain figures for the occurrence of the three forms.

In some examples of the male the white bands on the upperside of the forewings are widened, and, in the extreme form *urvasi* (C. and R. Felder) the white area is more extensive than the black.

The green spiny larva has a large brown patch on the 5th abdominal segment; the food plants include species of *Glochidion* and *Mussaenda*.

P. nefte is a common butterfly on the plains, but is rather rare on the hills. The females are fond of *Lantana* blossom and frequent open country, but they are not common in the vicinity of towns. As far as our experience goes, the male is rarely found outside the forest. The species is distributed from China to India and Malaysia.

Of the remaining Malayan species of *Parathyma*, only *P. reta moorei* (Fruhstorfer) and *P. kanwa kanwa* (Moore) are other than uncommon.

These two butterflies are confined to the forested plains. They both lack a white post-discal spot in space 3 on the forewing, and the underside is greyish brown. The white cell-streak on the forewing, which is separated from a spot beyond, is entire in *P. kanwa* and twice constricted in *P. reta*. The rarer and much larger *P. larymna siamensis* (Fruhstorfer) is similar to the above two species but has the forewing cell-streak so divided that a small white spot is enclosed in the centre.

In *P. selenophora amharina* (Moore), the sexes are dissimilar. The male is distinctive in the obsolete white cell-streak on the forewing, and the female somewhat resembles a *Neptis*. In the latter sex, on the forewing, the white post-discal spot in space 3 is large and in line with the spots in spaces 1a, 1b and 2, and the white cell-streak is twice constricted, and followed by a diffuse wedge-shaped spot which, in fact, comprises two conjoined spots of which the costal one is the longer. *P. selenophora* is rather rare in primary forest at the usual elevations.

Two rare montane species of *Parathyma* are *P. cama gynea* (Swinhoe) and *P. ranga malaya* (Pendlebury). The first-named is similar to *P. nefte*, but in the male of *P. cama* the subapical spot on the forewing above is orange and not white, and the orange coloured female differs from ♀-f. *neftina* as stated in the key. *P. ranga* is distinctive in having two or three obscure white spots in the cell on the forewing above instead of the usual white streak.

P. ranga and *P. abiasa clerica* (Butler) are the only Malayan species of the genus with hairy eyes. The latter is found at moderate elevations (usually between 1,000 and 3,000 feet), and can be recognised because the white cell-streak on the forewing is followed by a pear-shaped spot, and between and slightly below the two is a small and obscure grey spot.

P. asura idita (Moore), which is also found at moderate elevations, is distinctive in that the white spots of the macular submarginal band on the underside of the forewing are black-centred, as are the apical spots of the hindwing post-discal band on both surfaces.

Genus *Modaza* Moore

Although most authors place *M. procris* in the genus *Limenitis*, the structure and habits of the adult, and the appearance of the larva are sufficiently distinct, in our opinion, to merit generic separation. The forewing cell is slenderly closed and the hindwing cell is open.

The larva is armed with spiny tubercles, of which those on the IInd and IIIrd thoracic segments are the longest, and the head is armed with short blunt spines.

The genus is represented throughout the Oriental Region, and a single species is found in the Moluccas.

Moduza procris milonia (Fruhstorfer)

Plate 42, figure 119 ♀; genitalia, Plate 6, figure 76

The Commander

This butterfly is somewhat similar in appearance to the English "White Admiral" (*Limenitis camilla* (Linnaeus)). On the upperside, the dark reddish brown wings are traversed by a broad white macular band extending from the costa on the forewing (near which it is broken) to near the mid-dorsum on the hindwing. The under surface is marked as above, but the basal halves of the wings are pale greenish grey.

The larva is brown, with darker markings, and the segments are armed with short spiny tubercles. The food plants include *Mussaenda frondosa*, *Wendlandia thyrsoides* and *Nauclea* (all Rubiaceae).

The butterfly is common on forest roads in the neighbourhood of streams and rivers; it does not usually frequent open country, nor does it ascend the hills. *M. procris* is widely distributed, occurring from India and China through Malaysia as far east as the Lesser Sunda Islands.

Genus Limenitis Fabricius

In the Malayan species of *Limenitis* the cells are closed in both wings. A further difference between *Moduza* and *Limenitis* is that, in the former, the lower discocellular vein is curved outwards so that vein 4 arises some distance from vein 3; in *Limenitis* this discocellular is straighter and shorter and vein 4 arises very close to vein 3. The sexes are alike.

The genus is represented in North and Central America and throughout the Palaearctic and Oriental Regions.

The two green-banded Malayan species, *L. daraxa theoda* Fruhstorfer and *L. agneya* Doherty, are found only at high elevations in the Peninsula. Both are local, and usually settle high out of reach of the net, and, even if repeatedly disturbed, they return persistently to the same perch. *L. daraxa* is found from Sikkim to Neomalaya, but *L. agneya* is known only from Malaya and Sumatra.

Key for the separation of the species of LIMENITIS

- 1 (2) Forewing with the three anterior spots in line with the rest of the green discal band. *L. daraxa*
- 2 Forewing with the three anterior spots more or less at right angles to the rest of the discal band. *L. agneya*

Genus Pandita Moore

Structurally close to *Parathyma* and *Limenitis*. Cell slenderly closed on the forewing and open on the hindwing. Both cells remarkably short, being hardly more than one third of the distance from the base of the wing to the termen.

The single species is Malaysian, and, in the Peninsula, it is confined to lowland forest. The life history is unknown.

In *P. sinope sinope* Moore (Plate 42, fig. 122 ♂; genitalia, Plate 6, fig. 77) the wings are orange, and the markings on the upperside comprise dark

brown shading in the basal halves of the wings, a blackish brown post-discal band which is inwardly diffuse, and three dark lines in the marginal areas. The races from Paramalaya are remarkable for the white discal fascia on the forewing.

Parthenos Group of Genera

Larvae with long branched spines, of which those on the IIInd and IIIrd thoracic segments are the longest.

In spite of the position of the precostal vein on the hindwing, the two genera comprising this group are placed with the Limenitini by most authors. In both genera the cells are slenderly closed on both wings.

Key for the separation of the genera of the PARTHENOS group

- 1 (2) Palpi smooth beneath. Forewing with vein 4 evenly curved as usual. Hindwing without a prediscal cell. Upperside brown, with orange-brown markings, and a white post-discal fascia. *Lebadea*
- 2 Palpi hairy beneath. Forewing with vein 4 sharply angled about halfway along its length (fig. 73). Hindwing with a narrow prediscal cell. Upperside marked with green and blue, and with a white, hyaline, macular, post-discal band on the forewing. *Parthenos*

Genus *Lebadea* C. Felder

The forewing is long and narrow, and falcate at vein 6. The larvae have long branched spines on all segments and those on the IIInd and IIIrd thoracic segments are much longer than the rest. The single species is distributed from India to Malaysia.

Lebadea martha malayana Fruhstorfer

Plate 42, figure 120 ♂; genitalia, Plate 6, figure 78

The Knight

The ochreous brown wings are marked with a complex pattern, of which the most prominent feature is the white post-discal band. Outwardly, on the forewing, this band is margined with white lunules, and the distal half of the hindwing is coloured a brighter orange. The female has distinctly broader wings and the forewing apex is not strongly whitened as in the male.

L. martha is the only Malayan butterfly known to occur in distinct races in the Langkawi Islands, north Kedah and Malaya proper. The Langkawi subspecies *martha* (Fabricius), of which the type specimen (plate II, fig. 6) was taken by Koenig at Pulau Salang, in Peninsular Siam, in 1779, differs from *malayana* from Malaya proper in the more strongly whitened apex to the forewing, and in the brighter and more extensive orange area beyond the white median band on the hindwing. The Kedah race *koenigi* Corbet is intermediate between the other two. The Kedawi races occur abundantly flying at *Lantana* blossom in secondary growth near human habitations. In Malaya proper, however, the species is confined to open forest on the plains.

The larva is dark brown with two bright green lateral patches.

Genus *Parthenos* Hübner

The narrow prediscoidal cell on the hindwing is most easily seen from the upperside, through the forewing, after the application of benzene to both surfaces.

Larvae with pairs of branched spines on the IIInd and IIIrd thoracic and the 1st and 8th abdominal segments, and the head set with very short simple spines.

Distributed from Ceylon, through India and the Archipelago, to New Guinea and the Solomon Islands, but absent from Australia.

Parthenos sylvia lilacinus Butler

Plate 42, figure 121 ♂

The Clipper

This magnificent butterfly is black, with blue and green lines and stripes, and the forewing has a post-discal series of large, white, hyaline spots: it is quite unlike any other Malayan species.

In Kedawi, *P. sylvia* is found commonly at the flowers of *Lantana* in open country and in the neighbourhood of villages; it is less frequent on the east coast of Malaya, where it also frequents secondary growth. In the rest of the Peninsula it is rare, but occurs most often between December and February, and may be seen at *Lantana* flowers on the forest edge. It is strong, rather lofty and somewhat erratic on the wing, and very difficult to capture. It appears to be confined to the plains.

The larva has been described as green to yellowish brown, with a dark brown dorsal line, and transverse white dotted segmental lines. The segments are set with dark purple branched spines. The food plants include *Adenia palmata* and *Tinospora cordifolia*.

The species occurs from Ceylon to China, and through the Archipelago to the Bismarcks.

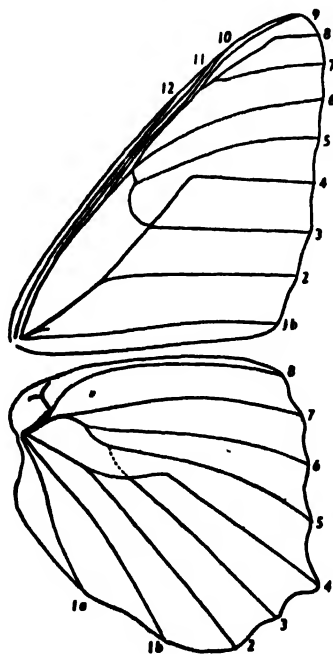


Fig. 73. *Parthenos sylvia* ♂. Venation.

Euthalia Group of Genera

Larvae green, with a single lateral row of very long, horizontally projecting, delicately branched spines.

Butterflies rather robust. Hindwing cell open; forewing cell open in *Tanaecia* and in the *cocythus* and *aconthea* groups of *Euthalia*.

Key for the separation of the genera of the EUTHALIA group

- 1 (2) Palpi third segment long and pointed (fig. 74). Underside hindwing with two or three post-discal rows of dark sagittate markings (usually more distinct in ♂). *Tanaecia*
- 2 Palpi third segment short and blunt. Underside hindwing not marked as above. *Euthalia*

Genus *Tanaecia* Butler

In three species the males are dark brown with a broad blue border on the hindwing; otherwise the butterflies are greyish ochreous brown, with a broad, whitish, post-discal fascia composed of helmet-shaped spots and bearing dark sagittate markings. The great similarity between the representatives of the species of the *T. pelea* group in Malaya, Sumatra and Borneo, whereby it is easier to determine the country of origin of a specimen than to identify the species, is discussed on page 43.

Usually, the male genitalia show specific differences, and are characterised by the tapered valvae, the short and stout aedeagus, and the membranous gnathos which is furnished with a series of long spines (see Plate 6, figs. 79–81; Plate 7 figs. 82–84). The early stages are unknown and the genus is confined to Malaysia and the Philippines.

(Basic literature: Corbet, 1941h.)

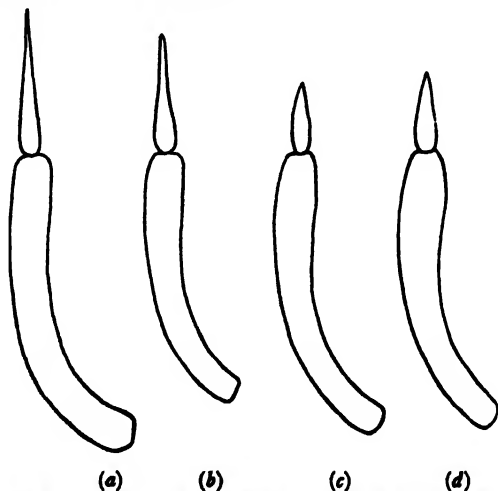


Fig. 74. Palpi in (a) *Tanaecia pelea*, (b) *T. aruna*, (c) *T. munda* and (d) *T. clathrata*.

Key for the separation of the species of TANAEICIA

- 1 (8) ♂♀ upperside pale greyish ochreous brown to pale purple brown, with the white post-discal bands outwardly bordered by dark sagittate markings; upperside hindwing tornal area not blue- or purple-washed. *Pelea* group
- 2 (7) Underside hindwing with two series of dark post-discal spots, both running from costa to tornus. Upperside forewing with the white helmet-shaped spots in spaces 2 and 3 not separated from the sagittate submarginal markings.

- 3 (4) Palpi third segment very long and needle-like (fig. 74a). *T. pelea*
 4 Palpi third segment shorter and blunter (fig. 74c, d).
 5 (6) ♂ upperside and underside hindwing with only the apical portion of the post-discal band whitened; hindwing narrowing rather sharply towards the tornus; ♀ forewing rather falcate as in *T. pelea*. *T. palguna*
 6 ♂ upperside and underside hindwing with the post-discal band more strongly whitened, and the sagittate markings larger and farther removed from the termen; hindwing termen more rounded. ♀ forewing termen straighter and only slightly falcate; upperside and underside hindwing with the sagittate markings farther from the termen; upperside forewing white fascia not as sullied as in *T. palguna*. *T. munda*
 7 Underside hindwing with three series of black post-discal spots, the middle series usually not extending above vein 6. Upperside forewing with the white helmet-shaped spots in spaces 2 and 3 separated from the sagittate markings. Palpi third segment nearly as long and fine as in *T. pelea* (fig. 74b). *T. aruna*
 8 ♂ upperside dark brown with a broad blue border on hindwing. ♀ upperside pale chocolate-brown, somewhat resembling that sex of *T. munda*, but with the tornal half of the hindwing fascia washed with purple (*T. clathrata*); or upperside dark brown with obscure markings (*T. julii*). *Julii* group
 9 (10) Underside forewing ochreous brown; underside hindwing greenish ochreous in ♂, pale powdery blue in ♀. *T. julii*
 10 Underside forewing and hindwing unicolorous.
 11 (12) ♂ upperside hindwing border sky-blue, with a series of black dots near the inner edge; underside forewing with the inner edges of the dark, helmet-shaped, post-discal spots in spaces 1b to 4 in a straight line and parallel to the termen. ♀ unknown. *T. coelebs*
 12 ♂ upperside hindwing border purple-blue, with black sagittate markings in the centre of the border; underside forewing with the inner edges of the dark, helmet-shaped, post-discal spots in spaces 1b to 4 forming an irregular line. ♀ see 8 above. *T. clathrata*

Tanaecia pelea pelea (Fabricius)

Plate 42, figure 123 ♂

The Malay Viscount

The upperside is pale greyish ochreous brown, with white markings as shown in the figure. The underside is more ochreous, the distal half faintly tinged violaceous, and, in the male, the hindwing post-discal band is hardly paler than the rest of the wing, and is indicated by two rows of small, black, sagittate markings. The female is figured at Plate II, fig. 5.

The species is not uncommon in primary forest, but becomes scarcer as the hills are ascended. The early stages are unknown.

On Pulau Tioman occurs the remarkable race *irenae* Corbet, in which the ground colour is deep purple-brown. The species is found also in the Large Sunda Islands, and it is noteworthy that, in the strongly differentiated races from Java and the Andaman Islands, the third segment of the palpi is comparatively short and blunt as in the species in the *palguna* section.

T. aruna aruna (C. and R. Felder) differs from the Malayan race of *T. pelea* in that the white helmet-shaped spots in spaces 2 and 3 on the forewing are separated from the rest of the post-discal band. The remaining species of the genus have the third segment of the palpi comparatively short and blunt, and not long and needle-like as in the two species mentioned above. All are rare, *T. coelebs* and *T. clathrata* decidedly so, although *T. julii bougainvillei* Corbet, which is dark brown above, with the hindwing blue-bordered in the male, and *T. palguna*

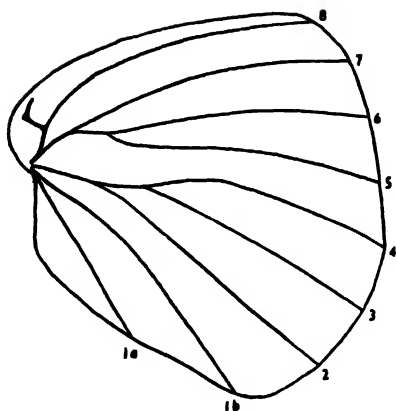


Fig. 75. *Euthalia lepidea* ♀. Venation of hindwing.

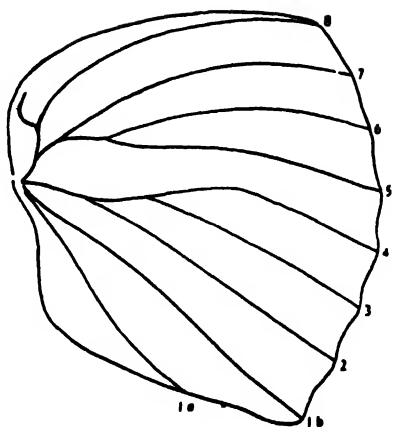


Fig. 76. *Euthalia aconthea* ♂. Venation of hindwing.

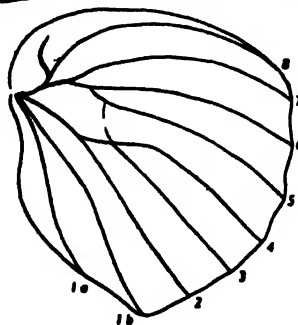
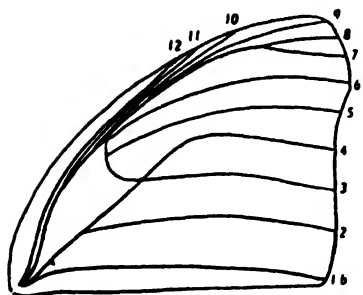


Fig. 77. *Euthalia darya* ♂. Venation.

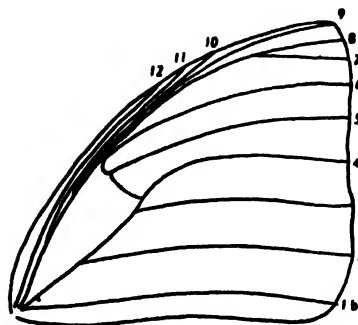


Fig. 78. *Euthalia dirtea* ♂. Venation of forewing.

consanguinea Distant which resembles *T. pelea*, should be found in most collections.

Except for *T. pelea* and *T. julii*, the Malayan species of *Tanaecia* are not found above 2,500 feet and are Neomalayan in distribution. *T. julii* occurs on the plains in Kedawi, but is strictly montane in Malaya proper; it has been recorded from Sumatra (although we have seen no examples), and the British Museum has a few specimens from the island of Bawean, between Borneo and Java.

Genus *Euthalia* Hübner

This large genus is remarkable for the dissimilarity between the sexes, and for the pronounced geographical variation shown by some species; indeed, for diversity of form the genus is unparalleled in the Eastern tropics. In many species the male is dark brown above, with a broad blue border on the hindwing, while a usual type of female has the wings pale ochreous brown, with a broad, whitish post-discal fascia, often composed of helmet-shaped spots, and resembling a *Tanaecia*. In the species of the *cocythus* group, and in *E. monina*, the male has a dark brand at the base of spaces 6 and 7 on the upperside of the hindwing.

The male genitalia are usually characterised by the blunt and rounded valvae; in the *aconthea* group they are a reliable guide to the separation of the species (except *E. merta* and *E. mahadeva* in which the genitalia are identical in both sexes), but they are similar in all species in the *cocythus* group (see Plate 7, figs. 85-99).

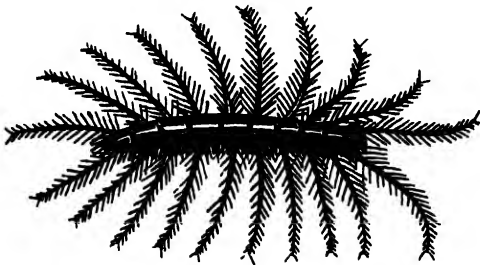


Fig. 79. *Euthalia aconthea*. Larva.



Fig. 80. *Euthalia aconthea*. Pupa.

Like the *Tanaecia* species, the adults are forest butterflies, with a predilection for fallen fruit, and they are fond of sunlit paths and forest clearings. The green larvae lie along the midrib of a leaf of the food-plant, with the feathery appendages pressed against the surface of the leaf. Although it reaches its greatest development in Malaysia, the genus occurs from Palaearctic China, Ceylon and India to the Papuan sub-region.

(Basic literature: *cocythus* group, Talbot and Corbet, 1943; *aconthea* group, Corbet, 1945c; *lubentina* section, Pendlebury and Corbet, 1938; Talbot, 1943b.)

Key for the separation of the species groups of EUTHALIA

- 1 (4) Both cells open.
- 2 (3) Hindwing precostal vein angled and usually with a spur developed at the angle (fig. 75). Hindwing termen straight from the apex to just above vein 3, where it is slightly angled, giving the wing a rectangular appearance. ♂ upperside hindwing with a blue or grey border. ♀ upperside pale greyish ochreous brown, with a whitish post-discal fascia (except in *E. lepidea* ♀ which resembles the ♂).
cocythus group (below)
- 3 Hindwing precostal vein curved and simple (fig. 76). Hindwing termen rounded. ♂ hindwing tornus produced and pointed. ♀ tornus slightly angled. ♂ upperside deep brown without a blue border on the hindwing (except in *E. monina*, *E. mahadeva* and *E. phemus*). ♀ upperside brown with a white or whitish post-discal fascia.
aconthea group (below)
- 4 Forewing cell slenderly closed (fig. 77).
- 5 (6) Forewing apex falcate. Forewing with vein 4 arising at or just beyond the origin of vein 3 (fig. 77). Upperside brown, usually with a greenish hue, and with a pale greenish-white post-discal fascia (except in *E. evelina* which has a reddened cell spot on the forewing).
evelina group (p. 235)
- 6 Forewing apex not falcate. Forewing with vein 4 arising well beyond the origin of vein 3 (fig. 78). Underside ochreous brown or greenish, with numerous yellowish or white spots.
dirtea group (p. 233)

Key for the separation of the species of the Coccytus group

- 1 (4) Underside forewing with the dark post-discal line obscure, sinuous or zigzagged and parallel to the termen.
- 2 (3) Sexes alike. Underside both wings with the termens strongly washed with pale grey (subsp. *malala*) or violaceous (subsp. *flora*)
E. lepidea
- 3 Sexes dissimilar. Underside hindwing termen not noticeably lighter than the rest of the wing. ♂ upperside hindwing with a pale blue border. ♀ upperside with a white post-discal fascia on both wings.
E. rapis
- 4 Underside forewing with the dark post-discal line prominent, more or less straight, and not parallel to the termen, being nearer at the apex than at the tornus. ♀ upperside forewing with white post-discal spots.
- 5 (6) ♂ upperside hindwing with a broad, bluish and lavender-grey border. ♀ upperside with a prominent brown stripe from the apex on the forewing to the mid-dorsum on the hindwing.
E. coccytus
- 6 ♂ upperside hindwing border pale blue and of the usual width. ♀ upperside not traversed by a dark stripe.
E. godartii

Key for the separation of the species of the ACONTHEA group

- 1 (18) Underside without red cell-spots.
aconthea section
- 2 (17) Forewing not prominently falcate. Upperside hindwing without a white spot covering vein 8 at its origin.
- 3 (4) Underside forewing and hindwing dark submarginal line continuous and highly zigzagged. ♂ upperside hindwing usually with a blue border, and forewing tornus bronzy blue.
E. monina
- 4 Underside hindwing dark submarginal line indicated by separated spots.
- 5 (16) Upperside forewing space 7 not whitened. ♂ upperside forewing dark submarginal line, when present, more or less parallel to the termen. ♀ upperside forewing without a clearly defined, dark, oval, post-discal patch on the costa entirely surrounded by the whitish fascia.
- 6 (11) ♂ upperside forewing without white sub-custal spots beyond the cell. ♀ upperside forewing pale post-discal fascia more or less parallel to termen.
- 7 (8) Upperside with the dark submarginal line continuous and zigzagged on both wings. Underside forewing cell-end spot narrower than usual. ♂ upperside forewing brown with an ochreous hue, underside golden brown. ♀ upperside forewing without separated whitish spots on the inner edge of the pale post-discal fascia in spaces 2 to 6.
E. kanda
- 8 Upperside with the dark submarginal lines indicated by separated spots on the hindwing and, usually, on the forewing also. Underside forewing cell-end spot broad as usual. ♂ upperside deep chocolate-brown. ♀ upperside forewing pale with prominent, whitish, separated spots on the inner edge of the post-discal fascia in spaces 2 to 6.
- 9 (10) ♂ upperside hindwing without a blue border. ♀ upperside hindwing with the inner edges of the whitish post-discal spots excavated; underside dark submarginal spots not pointed inwards.
E. moris

- 10 ♂ upperside hindwing with a pale blue border. ♀ upperside hindwing with the inner edges of the whitish post-discal spots entire and convex towards the wing base; underside dark, sagittate, submarginal spots pointing inwards. *E. mahadeva*
- 11 ♂ upperside forewing with white sub-costal spots beyond the cell-end. ♀ upperside forewing pale post-discal fascia oblique, running from the mid-costa towards the tornus.
- 12 (13) Underside hindwing termen washed with lavender. ♂ upperside hindwing tornal area pale blue. ♀ upperside forewing with a clear white, oblique fascia, narrowing from costa to tornus (this fascia much reduced in subsp. *corbeti*); upperside hindwing without submarginal spots. *E. phemius*
- 13 Underside hindwing termen not washed with lavender. ♂ upperside hindwing without a blue border. ♀ upperside forewing pale fascia sullied; upperside hindwing with dark submarginal spots.
- 14 (15) Underside forewing with the pale post-discal spots in spaces 2 to 6 with their centres in line, or almost in line; in ♀ the spots in spaces 2 and 3 are as large as those in spaces 4 to 6. *E. agnis*
- 15 Underside forewing with the pale post-discal spots in spaces 2 and 3 moved inwards, and their centres not in line with those in spaces 4 to 6; in ♀ the spots in spaces 2 and 3 are much smaller than those in spaces 4 to 6. *E. aconthea*
- 16 Upperside forewing space 7 whitened. ♂ upperside forewing dark submarginal line oblique (nearer the apex than the tornus), and in line with the broad, dark, discal line on the hindwing. ♀ upperside forewing with a dark, oval, post-discal patch on the costa bounded by the whitish fascia. *E. alpeha*
- 17 Forewing prominently falcate. Upperside hindwing with a small white spot covering vein 8 at its origin. Upperside ashy grey, median areas greenish. ♀ upperside forewing with a post-discal fascia of white spots. *E. anasia*
- 18 Underside with red cell-spots. *lubentina* section
- 19 (20) ♂ upperside forewing with no white spots beyond the cell. ♀ upperside hindwing with an orange-red band, extending from the costa almost to the middle of the inner margin. *E. djata*
- 20 ♂ upperside forewing with white spots beyond the cell. ♀ upperside hindwing without a red band, although red spots may be present.
- 21 (22) ♂ upperside forewing cell-spots reddened, although sometimes only faintly so. ♀ underside forewing white post-cellular spot in space 4 touching the reddened cell-end spot. *E. lubentina*
- 22 ♂ upperside forewing cell-spots not reddened. ♀ underside forewing white post-cellular spot in space 4 not touching the reddened cell-end spot.
- 23 (24) ♂ fore-legs reddened. ♀ upperside with a broad, white, macular post-discal fascia on both wings. *E. adonia*
- 24 ♂ fore-legs not reddened. ♀ upperside without a broad, white, median fascia on either wing. *E. whiteheadi*

Key for the separation of the species of the *EVELINA* group

- 1 (4) Upperside forewing without a continuous pale fascia, and without spots in spaces 4 and 5.
- 2 (3) Upperside forewing with a red spot in the cell. Upperside without whitish spots. *E. evelina*
- 3 Upperside without a red cell-spot. Upperside with a post-discal series of separated whitish spots on both wings. *E. danya*
- 4 Upperside with a pale post-discal fascia, continuous from the costa on the forewing to the tornus on the hindwing.
- 5 (6) Upperside forewing upper costal spot of the whitish median band not moved inwards. *E. recta*
- 6 Upperside forewing upper costal spot of the whitish median band moved inwards. *E. leusa*

Key for the separation of the species of the *DARTIA* group

- 1 (a) Underside hindwing rich golden brown in ♂, pale greenish blue in ♀. ♂ upperside black, with the broad blue border on the hindwing extending along the termen on the forewing. ♀ upperside dark brown with yellowish spots. *E. dartia*
- 2 Underside hindwing yellowish brown, with the discal area darkened. Upperside dark brown with yellowish spots. *E. carusae*

Euthalia lepidea matala* (Fruhstorfer)Plate 42, figure 124 ♀***The Grey Count**

The male is velvety blackish brown, with the broad ashy grey marginal band on the hindwing continued narrowly along the termen of the forewing. The female is larger, with the hindwing band more buff coloured. In both sexes the forewing is strongly falcate. The subspecies *matala* is strictly confined to the forested hills above 2,500 feet in Malaya proper, and is not uncommon.

The larva is green and feeds on *Melastoma malabathricum* (Singapore rhododendron) and *Careya arborea*. The pupa is green with golden spots.

In the subspecies *flora* (M. R. Butler) (The Blue Count), from Kedawi, the grey border on the hindwing is replaced by pale blue; of the rather variable female, a number of forms have been described. In ♀-f. *penerka* Talbot and Corbet, the blue bordering on the hindwing is almost obsolete, and the pale post-discal band on the forewing is so distinct that the butterfly approaches the female of *E. iapis puseda* (Moore) in appearance, although much darker.

E. lepidea extends from India to Malaya, and there is a race of the *lepidea* form from the Mentawi Islands, off the west coast of Sumatra. The blue *flora* form extends only as far north as the Ataran Valley in Tenasserim, beyond which it reverts to the *lepidea* form. We have taken the *lepidea* form on the plains near Rangoon.

Of the rare *E. cocyus cocyus* (Fabricius), which is not found south of the Langkawi Islands, the forewing is more strongly falcate than in *E. lepidea*. The male has the greyish blue border on the hindwing broader, and the female, which lacks the blue hindwing band, has several white spots in the post-discal area of the forewing.

Euthalia iapis puseda* (Moore)Plate 42, figure 125 ♂, 126 ♀***Horsfield's Baron**

This is the most abundant member of the genus in Malaya, and the female is commoner than the male. In the latter sex, the upperside is a rich velvety black, with a broad bright blue marginal border on the hindwing, while the female is pale greyish ochreous brown (much as in *T. pelea*), with a post-discal fascia of white, helmet-shaped spots on both wings.

The species occurs at all elevations in well-wooded localities in the Peninsula, but has not been found in the Langkawi Islands. It is often taken at fruit bait. The species has been bred in Java, although the food plant has not been recorded.

E. iapis is practically confined to Malaysia. The polymorphism shown by the Bornean subspecies is paralleled by that of *Tanaecia pelea* on this island. The Javanese and Palawan races are so different that they have hitherto been regarded as distinct species. The Palawan race, *E. iapis semperi* Staudinger, is of interest in that the sexes are alike, having a pattern resembling that of the female of the Malayan subspecies.

E. godartii asoka (C. and R. Felder) is much less common than *E. iapis*, and the males of the two species may easily be confused. In the female, which bears a general resemblance to that sex of *E. iapis*, the white post-discal band on the forewing consists of five long, oval, contiguous spots, and below it are two small white spots in space 1b. In ♀-f. *asoka* (C. and R. Felder), the submarginal areas are pale greyish blue, while they are greyish white in ♀-f. *jordani* (Fruhstorfer). This species is found at all elevations in primary forest in Malaya; it is distributed from south Burma to Malaysia and the Philippines, and occurs also in the Langkawi Islands.

***Euthalia monina monina* (Fabricius)**

Plate 43, figure 127 ♂, 128 ♀

The Malay Baron

After *E. iapis*, *E. monina* is the commonest species of the genus in the Peninsula. It does not frequent quite the same localities, however, preferring rather damp, but open, situations, where there is a good growth of bamboo. In suitable localities the species may be very common.

The male is dark brown above, with the blue distal border on the hindwing bearing a series of small black sagittate markings, which may be united in individuals to form a continuous line. The male occurs in other less common but more or less well-defined forms, although intergrades are not rare. The typical ♂-f. *monina* is as described above; in ♂-f. *decoratus* (Butler) the upperside is paler, brown, the paler post-discal fasciae are more clearly defined, and the hindwing is bordered with coppery green; in ♂-f. *gardinieri* (Fruhstorfer), the upperside is dark brown with obscure fasciae, and without a coloured border on the hindwing. The female resembles that sex of *E. iapis*, but the presence of the dark zigzagged line in the centre of the white post-discal band on the forewing in *E. monina* separates the two immediately.

Little appears to be known regarding the early stages of this common insect, except that the larva has been found on *Clidemia hirta* (an introduction from South America) in Java.

The species occurs throughout Malaya in primary forest at all usual elevations. Abroad it is found from Sikkim to Indo-China, and through Malaysia to the Lesser Sunda Islands as far east as Sumba. The striking polymorphism shown by the male is confined to Neomalaya, and, as usual in the group, attains its maximum in Borneo.

Euthalia aconthea gurda* (Fruhstorfer)Plate 43, figure 129 ♂*

The Baron

After *E. monina* this is the commonest species of the *aconthea*-group in Malaya. It frequents primary forest on the plains, but, as the larva feeds on *Mangifera indica* (mango), occasionally it is found in some numbers in orchards and gardens. The butterfly is rather local, and appears not to move far from the neighbourhood of the food-plant.

The wings are dark brown, paler in the female, with a broad but rather obscure post-discal band on both wings; the inner edge of this band is defined by a few small white spots on the forewing, which are larger in the female. The underside is dark brown, and space 7 on the forewing is whitened.

The green larva has a yellow dorsal stripe, and has been found feeding on *Anacardium occidentale* (cashew) and *Loranthus scurrula*, as well as on *Mangifera indica* (mango) (figs. 79 and 80).

In the Langkawi Islands occurs the subspecies *garuda* (Moore), which differs from the subspecies *gurda* from Malaya proper in the more contrasted colouring on the upperside. *E. aconthea* is widely distributed, ranging from Ceylon and India through Malaysia to Sumba and Sumbawa in the Lesser Sunda Islands.

The remaining species of the *aconthea*-group are distinctly rare. The male of *E. alpheda jamuna* Fruhstorfer resembles that sex of *E. aconthea* in general appearance, but it can be separated from this and from the male of all other species in the group as the dark, oblique, submarginal band on the forewing is co-linear with the similar dark median band on the hindwing. The males of *E. phemius ipona* Fruhstorfer and *E. mahadeva zichrina* Fruhstorfer have a blue border on the hindwing, and the females of these two species and of *E. kanda marana* Corbet have the *E. monina* type of colouring and pattern. Several of these species are represented by different races in the Langkawi Islands.

The species of the *lubentina* section of the *aconthea* group are differentiated by the greenish colour and red spotting, and the females have a prominent white fascia on the forewing. The males have the distal edge of the valva spined and not smooth as in the other species of the group; in *E. whiteheadi* 2 or 3 of these spines are larger and longer than the rest, and this serves as a reliable means of identifying the species.

The commoner species of the *lubentina* section are *E. lubentina malaccana* Fruhstorfer and *E. adonia pinwilli* Pendlebury and Corbet, and, in these, the males are difficult to separate. *E. adonia* has the fore-legs reddened in the male, while, usually, in Malaysian *E. lubentina*, they are not so coloured, although some Malayan examples of this latter species from such diverse localities as the Langkawi Islands, Pahang (Gunong Bedong, 3,500 feet) and Selangor (Kuala Lumpur) have been found with red

fore-legs. We imagine the explanation to be that there has been some infiltration of *E. lubentina indica* Fruhstorfer, which has reddened fore-legs, from Burma southwards, and more systematic collecting may establish the presence of a distinct race of the species in northern Malaya.

The female of *E. adonia* is distinctive in the broad white fascia on both wings.

The larva of *E. lubentina* is grass-green and, like that of *E. adonia*, feeds on *Loranthus*. Both species are found in primary forest in Malaya, but they are taken occasionally in secondary growth, and in the neighbourhood of villages.

All the species of the *aconthea* group mentioned are predominantly Malaysian in distribution. *E. aconthea* and *E. lubentina* occur as far west as Ceylon, *E. alpheda*, *E. merta* and *E. lubentina* have reached the Philippines, but only the last-named species is found in Celebes.

***Euthalia evelina compta* Fruhstorfer**

Plate 43, figure 130 ♂

The Redspot Duke

A large species with the upperside dark brown and the underside greyish green. There is a red cell-spot on the forewing above, and the cell-spots and the spot in space 7 on the hindwing beneath have their centres reddened. The forewing is strongly falcate, and the female is paler and larger than the male. The butterfly comes readily to fruit bait, and is largely confined to primary forest at low elevations, where it is not uncommon.

The green larva has a wine-coloured dorsal spot on several of the segments, and the feathery lateral appendages are longer than in any other known *Euthalia* species. It feeds, elsewhere, on *Diospyros*, which does not grow in Malaya. The species is distributed from Ceylon to Celebes.

A rather similar butterfly in size and appearance is *E. dunya dunya* (Doubleday), but the forewing is less falcate, the upperside is brown with an irregular post-discal series of creamy spots on both wings, and there are no red cell-spots. The species is not uncommon in the forest in Kedawi, but it is rarely found south of Perak.

The two remaining species in the *evelina* group, *E. teuta goodrichi* Distant and *E. recta monilis* (Moore), are smaller, with less falcate forewing, and are characterised by the pale, greenish white, macular, post-discal band running from the costa on the forewing to the hindwing tornus; the female is paler and more ochreous, and the species can be separated as shown in the key. Both butterflies are largely confined to Kedawi as far as the Peninsula is concerned, although *E. teuta* has been taken in lowland forest in Malaya proper. This latter species is distributed from Assam to Burma, Malaysia and the Philippines, but *E. recta* is not found south of Kedawi nor north of Assam.

Euthalia dirtea dirteana* CorbetPlate 43, figures 131 ♂, 132 ♀*

The Archduke

This species is the largest Malayan representative of the genus. In the male the wings are dark brown above, with a broad blue distal border on the hindwing which is continued more narrowly along the termen on the forewing; the underside is a deep ochreous brown, with yellowish spots. The female is dark brown above, profusely spotted with yellow above and white below, and the underside of the hindwing is pale greyish green. In the very rare *E. canescens pardalina* Staudinger, both sexes are marked above as in the female of *E. dirtea*, but the underside is deep ochreous brown, with clearly defined yellowish spots.

E. dirtea is fairly common throughout Malaya, and frequents rather open primary forest at all elevations up to about 4,000 feet. The female is more abundant than the male, but both sexes are attracted to rotten pineapples, on which they feed greedily. The early stages have not been described.* The range of the species extends from Sikkim to Malaysia and the Philippines. *E. canescens* is confined to Neomalaya and Nias. On account of the rather striking differences between these two species and the rest of the *Euthalia*, some authors place them in a separate genus — *Adolias* Hubner.

Apatura Group of Genera

Larvae smooth and slug-shaped, head with a pair of horns, and the anal segment with a pair of pointed projections which are posteriorly directed. Pupal head with two long horns.

It is difficult to characterise the adults, which closely resemble the *Vanessa* group in venation and other respects.

Some of the species in the *Apatura* group bear a superficial resemblance to butterflies in other families or groups: the *Idrusia* female forms mimic the sexes of *Euploea diocletianus*, *Hestina* resembles a blue-grey *Danaus* and *Amnosia* females are similar to *Xanthotaenia busiris*.

Apart from the typical genus, the genera of the *Apatura* group are practically restricted to Palaearctic China and the Oriental Region.

Key for the separation of the genera of the APATURA group

- | | | |
|----|--|--------------------|
| 1 | (6) Eyes hairy. | |
| 2 | (3) Both cells open. Palpi pale buff and brown. | <i>Eulacura</i> |
| 3 | Both cells slenderly closed. Palpi beneath and antennae black. | |
| 4 | (5) Forewing termen excavate between veins 3 and 5. Forewing and hindwing submarginal markings sagittate. | <i>Dichorragia</i> |
| 5 | Forewing termen not excavate. Forewing and hindwing submarginal markings not sagittate. | <i>Stibochiona</i> |
| 6 | Eyes smooth. | |
| 7 | (12) Palpi brown or brown and white. | |
| 8 | (9) Both cells slenderly closed. Upperside forewing with a straight bluish (♂) or yellowish (♀) band from the mid-costa to the tornus. | <i>Amnosia</i> |
| 9 | Both cells open. Upperside forewing not as above. | |
| 10 | (11) Forewing may be slightly produced at vein 6 but is not prominently falcate. Hindwing not toothed. | <i>Apatura</i> |

* See Appendix, p. 494.

- 11 Forewing prominently falcate. Hindwing crenulate and distinctly toothed at vein 4. *Herona*
- 12 Palpi black or black and white. Both cells open (fig. 83).
- 13 (14) Forewing vein 10 arising from vein 7 (fig. 83). Hindwing excavate between veins 5 and 6. *Idrusia*
- 14 Forewing vein 10 arising from the cell as usual. Hindwing not excavate between veins 5 and 6.
- 15 (16) Palpi white, without a narrow black bar. Upperside forewing with an orange cell spot. *Sephisa*
- 16 Palpi beneath white, with a narrow black bar. Wings bluish grey, with the veins blackened. *Hestina*

Genus *Amnosia* Doubleday

Close to *Stibochiona*, but the eyes are smooth, the forewing termen straight, and the hindwing slightly but definitely angled at vein 4. The larva feeds on *Elatostema*. The genus is confined to Malaysia.

A. decora perakana Fruhstorfer is known only from a pair taken in Perak about fifty years ago.

The female of *A. decora* is a replica of *Xanthotaenia busiris*, while the male has the subapical band on the forewing pale blue and not yellowish. We have taken this species in highland forest in the neighbourhood of waterfalls in North-east Sumatra.

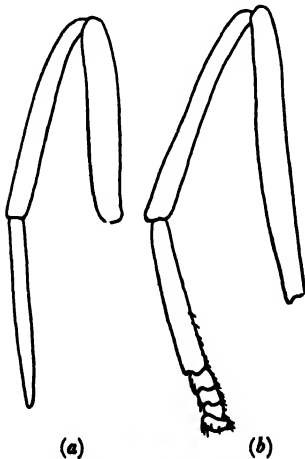


Fig. 81. *Amnosia decora*.
(a) Male. (b) Female fore-leg.

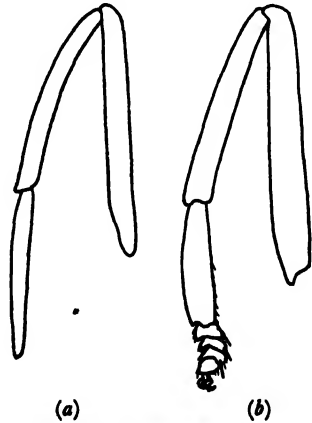


Fig. 82. *Stibochiona nicea*.
(a) Male. (b) Female fore-leg.

Genus *Stibochlona* Butler

Very similar to *Dichorragia*, but the cells are shorter. Eyes hairy in *S. nicea*, but not in other species of *Stibochiona*.

In *Stibochiona*, but in no other Malayan Nymphalid, the female has a pair of claws on the fore-tarsi.

S. nicea subucula Fruhstorfer is dark bluish black above, the forewing with a subapical and submarginal series of small white spots, and the hindwing with a white border and a submarginal row of black spots

inwardly suffused with blue. The female is paler than the male. *S. nicea* is found in forest at the usual elevations, and the Malay Peninsula represents the most southerly extension of the species.

Genus *Dichorragia* Butler

The forewing is only slightly excavated between veins 2 and 6, and the hindwing slightly produced at vein 1b.

The butterfly is dark grey, with obscure dark spots edged with pale blue, and with rather sharply defined whitish sagittate submarginal markings on both wings. It cannot be confused with any other species, and is distributed from India through the Archipelago to New Guinea.

D. nesimachus deiokes Fruhstorfer is a rather rare forest insect in Malaya, occurring at all usual elevations, and the males are usually taken in the neighbourhood of streams.

Genus *Apatura* Fabricius

Antennal club well developed. Eyes smooth (hairy in a few extra-Malayan forms).

The distribution is chiefly Palaearctic, but the genus is represented throughout the Oriental Region.

In the only known Malayan species, the male is deep purple-brown above, with the wing margins slightly paler; the female is orange-brown, with dark transverse fasciae in the basal halves of the wings, and a dark post-discal band, bearing a series of ocelli, traversing both wings. *A. parisatis siamensis* Fruhstorfer is confined to lowland forest in Malaya proper, and is distinctly local. The male may be seen at moist spots on forest roads, but the female is quite scarce.

It is curious that *A. ambica* Kollar appears to be absent from the Peninsula, although found in India, Burma, Indo-China and Sumatra. It can be easily recognised by the silvery-white underside, with orange wing margins, and an angled orange-brown band running from the forewing costa to the hindwing tornus. This orange band is dilated at the forewing tornus, where it encloses a black spot in space 2. We have taken it in the forested hills in North-east Sumatra.

Genus *Sephis* Moore

Antennal club long and gradual, and blunt at the apex. The forewing is excavated between veins 2 and 6, and the hindwing only slightly produced at the tornus.

Distributed from India and Palaearctic China to the mountains of Malaya.

S. chandra stubbsi Corbet is exceedingly rare in the Peninsula, where it is a comparatively recent discovery. The male is black above, with a curved, orange, macular band in the discal area of the forewing, and the

whole discal area of the hindwing coloured orange; the apical area of the forewing is black, with a white macular subapical band. In the female, the orange colouring is restricted to a cell-spot on the forewing.

Genus *Eulaceura* Butler

Very similar to *Apatura*, but the antennal club is long and gradual. The forewing is strongly falcate, and the hindwing is produced at the tornus.

The single species is confined to Malaysia and Hainan. In *E. osteria kumana* Fruhstorfer, which occurs in the forested lowlands of Malaya, the male is pale purple-brown above, with a white discal fascia increasing in width from the middle of the forewing to the mid-tornus on the hindwing. The female is dull ochreous brown, with obscure white fasciae in the distal halves of both wings, and suggests a female of a *Euthalia* species. The larva feeds on *Gironniera subaequalis*.

Genus *Hestina* Westwood

The forewing is falcate between veins 6 and 7, and the hindwing is produced slightly at vein 1b. The few species in the genus are remarkable for the close resemblance they bear to the blue-grey species of *Danaus*. The sexes are similar, although the female is larger.

No life histories are known. The genus is distributed from India to China, and through Malaysia to Celebes.

Hestina nama ruvanella Fruhstorfer

Plate 43, figure 133 ♂

The Circe

The wings are bluish-grey, with the veins heavily blackened, and the outer margin of the hindwing broadly bordered with deep reddish-brown. The butterfly is a good mimic of certain of the bluish grey species of *Danaus*, and especially of *D. melaneus*.

Hestina is swift in flight, but, when settled on the ground, or fluttering over low-growing herbage, it is very *Danaus*-like in behaviour and only a practised eye can discern its true identity.

The butterfly occurs at all elevations in well-wooded districts, but prefers flying near hill-tops at about mid-day and in the early afternoon. *H. nama* is not uncommon, and usually two or three butterflies may be found together.

The species has a restricted range, being found only from Sikkim to Sumatra.

Genus *Herona* Doubleday

The butterflies recall *Vanessa* in wing shape, but the colouring is much more sombre, and the wings are not so heavily scaled.

H. marathus angustata Moore is dark brown above, with orange stripes

(paler in the female), arranged somewhat as in *Neptis*. *H. sumatrana dusuntua* Corbet is dull ochreous brown, with rather obscure whitish fasciae, with a bluish tinge, in the distal halves of the wings.

H. marathus is a northern species, and the Langkawi Islands represent its most southern extension. *H. sumatrana* is purely Malaysian, and confined to the forested lowlands. Both species are rare in Malaya, and *H. sumatrana* has been taken on fruit bait on several occasions.

Key for the separation of the species of HERONA

- | | | |
|---|---|---------------------|
| 1 | (2) Upperside with a pale bluish-white post-discal fascia. | <i>H. sumatrana</i> |
| 2 | Upperside with orange or yellowish-white spots and stripes. | <i>H. marathus</i> |

Genus *Idrusia* Corbet

In the male, the hindwing is moderately excised between veins 2 and 4 as well as between veins 5 and 6. The female is strongly mimetic.

The larvae are of the usual *Apatura* type, and feed on species of Urticaceae. Oriental Region, except Ceylon and south India.

(Basic literature: Corbet, 1947a.)

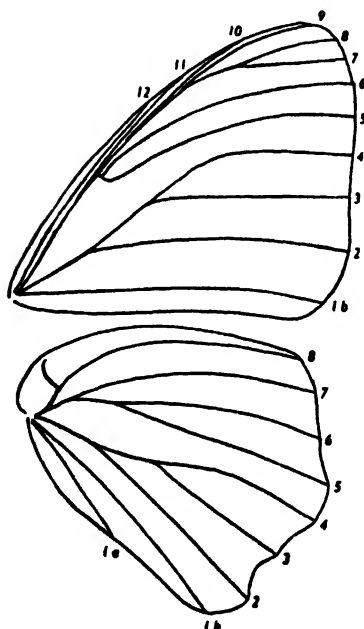


Fig. 83. *Idrusia nyctelius* ♂. Venation.

Idrusia nyctelius euploeoides (C. and R. Felder)

Plate 43, figure 136 ♂; genitalia, Plate 8, figure 100

The Courtesan

This species presents a striking instance of sexual dimorphism. In the male the forewing is deep bluish black, with cellular, discal, post-discal and submarginal series of white spots, and there is a long narrow bluish white streak in the basal half of space 1b. The hindwing is white, with the veins heavily blackened, and the broadly black distal margin has irregular series of white dots. In living specimens, the eyes are yellow in both sexes.

In ♀-form *isina* Corbet, which is a mimic of the male of *Euploea diocletianus*, the wings are deep bluish black, with a white post-cellular patch on the forewing, and the inner area of the hindwing broadly whitened. In ♀-form *euploeoides* (C. and R. Felder), which mimics the same sex of *Euploea diocletianus*, the wings are brown, and marked with a series of small, white, submarginal spots, and the hindwing is pre-

dominantly white. In some parts of its range, but not in Malaya, there is a further female form which is bluish black above and bears a mimetic resemblance to *Euploea algea* or *E. eynhovii*.

The butterfly is found in primary forest at moderate elevations ; the male may be taken at moist spots on the roadside, but the female is usually seen in flight among herbage after the manner of *Euploea* species. Males are not uncommon, but the females are rare.

The green larva recalls that of the European *Apatura*. The food plant is stated to be a species of *Urticaceae*.

The species is distributed from northern India through Malaysia to the Philippines.

Charaxes Group of Genera

Larvae smooth, rather stout, and somewhat slug-shaped, the head with two pairs (one pair in *Prothoe*) of long, divergent, fleshy, spiny processes, and the anal segment with a pair of short, stout, pointed projections.

Large and robust butterflies with the body short and stout. Forewing cell closed. In *Polyura* and *Charaxes* (*Prothoe* not examined), the aedeagus is remarkably long and slender.

Females are rare throughout the group.

Key for the separation of the genera of the CHARAXES group

- 1 (4) Hindwing with a pointed tail or tooth at vein 4, and, in *Polyura*, at vein 2 also (fig. 86).
- 2 (3) Hindwing cell slenderly closed. Hindwing with a single tooth or tail at vein 4 (except *C. solon*, which has subequal tails at veins 2 and 4). Upperside predominantly reddish to dark brown, and discal areas not white; underside ochreous to dark brown, with a cryptic pattern. *Charaxes*
- 3 Hindwing cell open. Hindwing with subequal pointed tails at veins 2 and 4. Wings predominantly pale yellowish or greenish white. *Polyura*
- 4 Hindwing with a short spatulate tail between veins 3 and 4. *Prothoe*

Genus *Prothoe* Hübner

The underside is variegated, and in *P. calydonia* it is beautifully coloured. The butterflies are forest lovers. The species of *Prothoe* are distributed from India and Malaysia to the Papuan Region.

Key for the separation of the species of PROTHOE

- 1 (2) Upperside forewing pale yellow, hindwing bluish-white, and with broad black borders on both wings. *P. calydonia*
- 2 Upperside blackish-brown, glossed with blue, and with a broad, pale blue, subapical band on the forewing. *P. franchi*

Prothoe calydonia calydonia (Hewitson)

Plate 43, figure 134 ♂

The Glorious Begum

In this magnificent species the yellowish white forewing and the bluish white hindwing are broadly bordered with black ; the underside is richly variegated with red, yellow, green, blue, brown and black. The female is larger, paler, and with broader wings than in the male.

Writing of the capture of this species at Ayer Panas, near Malacca, in 1854, Wallace says :

"I was one afternoon walking along a favourite road through the forest, with my gun, when I saw a butterfly on the ground. It was large, handsome, and quite new to me, and I got close to it before it flew away. I then observed that it had been settling on the dung of some carnivorous animal. Thinking it might return to the same spot, I next day after breakfast took my net, and as I approached the place was delighted to see the same butterfly sitting on the same piece of dung, and succeeded in capturing it. It was an entirely new species of great beauty . . . I never saw another specimen of it, and it was only after twelve years had elapsed that a second individual reached this country [England] from the north-western part of Borneo."

In the smaller *P. francki uniformis* Butler, the upper surface is dark brown, dusted with greenish blue, and the forewing is crossed by a pale blue subapical band which is splashed with white. The underside is richly variegated with greyish black, green and white.

Both the *Prothoe* species are rare, and frequent rather open forest at low elevations. They do not usually appear until midday, and often rest, head downwards, with closed wings, on tree trunks. They are attracted to fruit bait (*P. calydonia* to animal excreta also), and return to the same spot after being disturbed. In both species the females are much scarcer than the males. The larva of *P. francki* is pale purple-brown, and the green pupa is anally suspended by a silken thread. The larval food plant is *Oxymitra cuneiformis*. The life-history of *P. calydonia* is unknown.

Both species are distributed from Burma to Neomalaya and the Philippines ; *P. francki* occurs in Java also.



Fig. 84. *Polyura athamas*. Larva.



Fig. 85. *Polyura athamas*. Pupa.

Genus *Polyura* Billberg

Forewing with the costa strongly arched, the apex pointed and the termen concave.

The larvae feed on a wide variety of food plants, and the genus is distributed from Ceylon to Formosa, Australia and the Fiji Islands.

Key for the separation of the species of *POLYURA*

- 1 (4) Upperside predominantly brownish black, with the broad pale discal band not reaching the dorsum on the hindwing. Upperside hindwing base darkened.
- 2 (3) Upperside discal band white and broadly edged with blue. *P. schreiberi*
- 3 Upperside discal band pale yellowish green. *P. athamas*

- 4 Upperside pale yellow or greenish yellow, and the forewing apex blackened.
Upperside hindwing base not darkened.
- 5 (12) Underside hindwing with a dark crimson-brown band passing through the basal half of the cell, and meeting the post-discal band near the tornus.
- 6 (11) Underside forewing with the dark curved band from near the wing base passing through the end of the cell and meeting the post-discal band in space 4.
- 7 (8) Underside hindwing pale silvery area covers more than half the wing. *P. jalysus*
- 8 Underside hindwing pale area covers less than half the wing.
- 9 (10) Upperside forewing black margin not decreasing markedly towards the tornus.
- 10 Upperside forewing black margin decreasing markedly towards the tornus *P. moori*
- 11 Underside forewing with a broad Y-shaped stripe at the end of the cell extending to the base of vein 2 and not united with the post-discal band. *P. hebe*
P. eudamippus
- 12 Underside without a dark band, but with large discal spots. *P. delphis*

Polyura athamas samatha (Moore)

Plate 44, figure 137 ♂; genitalia, Plate 8, figure 101

The Common Nawab

The commonest member of the genus, *P. athamas*, has the wings above black, with a broad yellowish green discal band on both wings, and a prominent subapical spot of the same colour on the forewing; the under surface is paler, and the silvery green discal band is edged with crimson brown. The hindwing has two rather short pointed tails.

The males are found at damp spots on the banks of forest streams, or on decaying animal matter. In flight they are swift and erratic, and difficult to capture on the wing. The females are much rarer and prefer the confines of the forest.

The larva of *P. athamas* is dark yellowish green, with paler lateral stripes, and with four spiny horns on the head. It is secretive, feeding only at night, and the food plants reported include *Albizzia*, *Grewia*, *Caesalpinia* and *Acacia* (figs. 84 and 85).

The species is distributed throughout the Oriental Region.

Of the other Malayan species of *Polyura* single specimens are taken by the collector from time to time. *P. delphis concha* (Vollenhoeven) is a magnificent butterfly with a wing spread of about 100 mm. The upper-side is pale yellowish green, the apex of the forewing broadly blackened, and the hindwing has a narrow bluish green lunulate submarginal band: the hindwing is serrated at the margin and has three distinct tails, of which the middle one at vein 3 is the shortest. The silvery white underside has some blue discal spots, and a yellowish submarginal fascia, inwardly bordered by blue lunules, on both wings. *P. delphis* ranges from Assam to Malaysia.

The rare *P. eudamippus peninsularis* (Pendlebury) is slightly smaller than *P. delphis* and has two tails on the hindwing. Both wings are yellowish white with the base and costal and outer areas of the forewing smoky brown. The forewing has a yellow quadrate spot beyond the cell and a submarginal series of yellow spots on the black margin; the hindwing has a submarginal row of yellow spots on a blackish-grey band. The underside has transverse yellowish bars, with a distinct

Y-shaped mark at the end of the cell on the forewing. This race is known only from Cameron Highlands. The species is distributed from India to west China and Formosa and is not found south of Malaya.

In *P. hebe chersonesus* (Fruhstorfer), *P. moori moori* (Distant) and *P. jalysus jalysus* (C. & R. Felder), the upperside is greenish white, and the forewing has a broad black apical border, which is very wide at the apex but decreases in width towards the tornus and base of the costa. The underside has a large, pale silvery-green median patch: in *P. jalysus* this pale area covers much more than half the area of the wings but in *P. moori* and *P. hebe* it is much smaller. *P. moori* differs from *P. hebe*, among other details, in the uniform black border on the forewing and in the more extensive black apical area on the hindwing. *P. hebe* is represented in Singapore by a distinct race, *plautus* (Fruhstorfer), which has a broad black border on the hindwing.

The distribution of each of these three species is different: *P. hebe* occurs from Malaysia to the Lesser Sundas, *P. jalysus* from Burma to Malaysia and *P. moori* from Sikkim to Neomalaya.

A curious fact about *P. schreiberi tisamenus* (Fruhstorfer) is that the complete butterfly is rarely seen but, now and again, the four wings are found on the ground. The insect is found from India to Malaysia and appears to be of more frequent occurrence in Singapore Island than on the mainland. The butterfly can be easily recognised as the white median band on the upperside is ornamented with blue and is replaced by a silvery band on the underside. The bright green larva has two pairs of red, spiny horns on the head and a broad orange-yellow band on the 3rd abdominal segment.

Except for *P. athamas* and *P. eudamippus*, all the Malayan species of *Polyura* appear to be confined to the forested plains and, as yet, only *P. athamas* has been found on the Langkawi Islands.

Genus *Charaxes* Ochsenheimer

Similar to the foregoing genus, except for the closed cell of the hindwing, and the predominantly reddish-brown colour

of the wings. The butterflies possess strong powers of flight, but the males are carrion feeders, and, occasionally, they are taken on over-ripe fruit.

The larvae feed on a variety of plants, and closely resemble those of

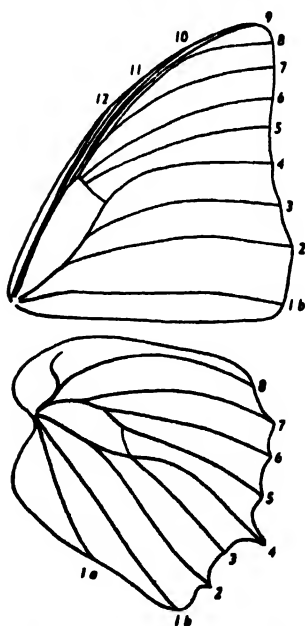


Fig. 86. *Charaxes polyxena* ♂.
Venation.

the preceding genus. The life history of very few of the species in our sub-region is known.

The genus is represented in south Europe, Africa and the Indo-Australian Region: it attains its highest development in Africa.

Key for the separation of the species of CHARAXES

- 1 (2) Upperside dark brown with pale yellow fascia. Hindwing with slender equal tails at veins 2 and 4. *C. solon*
- 2 Upperside with at least the basal half of both wings orange or orange brown. Hindwing toothed in ♂ and tailed in female at vein 4.
- 3 (12) Upperside hindwing marginal area not broadly paler than the rest of the wing.
- 4 (11) Upperside forewing without a pale bluish-white median band.
- 5 (10) Underside forewing costa not whitened at the base.
- 6 (7) Upperside forewing with a broad black border extending from the mid-costa to the tornus. Upperside hindwing with a prominent black apical patch. *C. polyxena*
- 7 Upperside forewing with a dark crenulate line internal to the rather narrow black marginal border.
- 8 (9) Underside pale ochreous brown. *C. marmax*
- 9 Underside deep purple-brown. *C. harmodius*
- 10 Underside forewing costa silvery white at the base. *C. distanti*
- 11 Upperside forewing with a broad, pale bluish-white, median band. *C. borneensis*
- 12 Upperside hindwing marginal area broadly pale bluish-white, with a series of white-centred black ocelli. *C. durnfordi*

Charaxes polyxena crepax Fruhstorfer

Plate 44, figure 138, ♂; genitalia, Plate 8, figure 102

The Tawny Rajah

Of the seven Malayan species of *Charaxes*, all are rare except *C. polyxena*, of which the males are taken singly at carrion or animal excreta on forest paths, or even on wide roads passing through wooded districts. All are shy and difficult to capture in flight; most of the species frequent heavy primary forest, and some are of very local distribution.

C. polyxena is a rich fulvous brown, with very broad black apical bordering on the forewing; the underside is a steely greyish brown traversed by dark irregular lines. In the female, the discal areas of the upperside of both wings are paler and of a more yellowish hue. Rarely, there occurs in the Peninsula a female form in which the wings above are predominantly white; this form is commoner in Burma than in Malaysia.

The dark green larva has four red spiny horns on the head, and red ocelli on the abdominal segments. It has been found on *Acronychia laurifolia*, *Adenanthera pavonina* and *Albizia falcata*. The species is generally distributed throughout the Peninsula in lowland forest; outside Malaya it occurs from Ceylon and India to China, and through the Archipelago to New Guinea and the Bismarcks.

Of the other Malayan *Charaxes*, *C. borneensis praestantius* Fruhstorfer is claret coloured above, and the forewing has a pale bluish-white median band, and a broad black distal border extending from the mid-costa to the tornus. *C. distanti distanti* Honrath is larger than *C. polyxena*, and coloured a pale fulvous brown: it is the only Malayan species in which the space between the costal margin and the sub-costal vein on the

underside of the forewing is white. The large *C. durnfordi durnfordi* Distant is a magnificent butterfly. It is chestnut brown above, with pale grey lunulate markings in the blackened outer area on the forewing: the broad pale bluish-white hindwing border, with white-centred black oval spots, identifies this species at a glance. Only a few specimens have been taken in the Malay Peninsula since it was first captured at Sungei Ujong in the last century.

C. durnfordi occurs from Assam to Malaysia, and is rare throughout its range. *C. borneensis* and *C. distanti* are Neomalayan, but the latter species extends to Burma. The widely distributed *C. solon echo* Butler, which is found almost throughout the Oriental Region (except Java), prefers more open country than its congeners; it is distinctive in the possession of a pair of calliper-like tails at veins 2 and 4 on the hindwing.

FAMILY LIBYTHEIDAE

The Beaks

Structurally, the few species in this family are closely related to the family Nymphalidae (q.v.). They differ in that the palpi are very

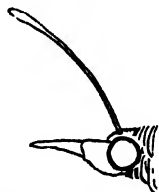


Fig. 87. *Libythea narina*. Head.

long, porrect and beak-like, and the fore-legs are imperfect in the male and functionally perfect and with a pair of tarsal claws in the female. The eyes are naked. The wings are short and broad, and the cells are closed by tubular veins. The forewing is falcate and truncate at the apex, and vein 1b is forked at the base. In the male, the dorsal portion of the genitalia is protected by a large bifid superuncus, and there is an homologous organ in the female.

The butterflies are low flying, but swift on the wing. The males frequent rocky situations in primary forest, and may be found congregated in damp spots. The females are very rare.

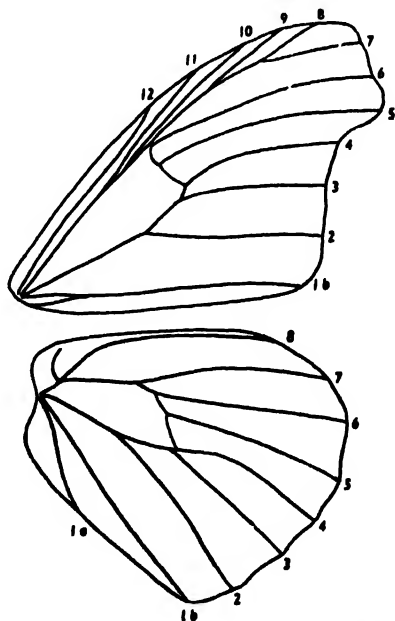


Fig. 88. *Libythea myrrha* ♂. Venation.

The larvae resemble those of some of the Pierid genera, being cylindrical, covered with minute delicate hairs, and with a small head. The pupa is smooth, not angulated, and suspended like those of the Nymphalidae; there is no median girdle.

The single genus *Libythea* occurs in south Europe, Africa, the Indo-Australian Region and America.

Genus *Libythea* Fabricius

The characters of the genus are those of the family, and the species can be readily recognised by the wing shape and the remarkably long and porrect palpi.

Key for the separation of the species of LIBYTHEA

- 1 (2) Upperside markings pale yellowish or white: forewing with a spot in the cell and a spot in space 2. *L. narina*
- 2 Upperside markings bright orange: forewing with an orange wedge extending from the base of the wing almost to the termen. *L. myrrha*

Libythea myrrha hecure Fruhstorfer

Plate 44, figure 139, ♂; genitalia, Plate 8, figure 104

The Club Beak

L. myrrha is dark brown above, with orange markings; these latter comprise a cuneiform band on the forewing running along the cubital vein from the base to space 2, a subapical fascia on the forewing, and a rather broad discal band on the hindwing. The butterfly is very local in Malaya, but, at times, males may be taken congregated at moist spots on forest roads, or in quarries on the forest edge at moderate elevations. They settle with closed wings.

The larva is dark green, and resembles that of *Catopsilia*; the food plant is *Celtis tetrandra*.

L. myrrha is distributed from Ceylon and northern India to western China and Malaysia.

There is some doubt regarding the Malayan status of *L. narina rohini* Marshall. The species occurs in Africa (where it is known as *L. labdaca* Westwood), and from Assam through the Archipelago to New Guinea, so that its presence in the Peninsula is almost certain. Nevertheless, there are no undoubtedly authentic Malayan specimens known to us. (Genitalia, Plate 8, fig. 103.)

A third species, *L. geoffroyi* Godart, has never been recorded from Malaya, although it is known from Burma and Siam, Borneo, Java and the Lesser Sunda Islands, and eastwards to the Bismarcks and Solomons. It is easily separated from *L. myrrha* and *L. narina* on account of the blue wing bases, and the sexes are dissimilar.

FAMILY RIODINIDAE

The rather small and delicate butterflies comprising this family are more closely related to the Lycaenidae than to the Nymphalid group of families. In many species the adults fly only in bright sunshine, and all are practically confined to primary forest. They are fond of settling on the upperside of leaves, with half-open wings, and they are usually found singly. Some of the species are rather local in distribution.

There is no single structural character which sharply separates the Riodinidae from other families. The eyes are naked or hairy. Palpi porrect, and usually small and slender. The fore-legs are imperfect and brush-like in the male, and functionally perfect and with a pair of tarsal claws in the female. Wings rather narrow and elongate. Forewing with vein 1b rather weakly bifurcate at the base. Hindwing with a precostal vein. The hindwing may be produced at the tornus, or lobed, or dentate or angled at vein 2, 3 or 4. Cells of both wings closed by tubular veins. The antennae are usually a little longer than half the forewing costa, and the club is spatulate, and broadens rather gradually. Only in *Laxita* are secondary sexual characters present on the wings of the males. As far as they have been examined, the male genitalia show a close affinity to those of the Lycaenidae, particularly in that the gnathos is represented by a pair of slender, curved hooks.

Usually, the larva is onisciform, broadest in the middle, tapering at each end, and is clothed with short hairs. The food plants are species of Myrsinaceae (*Myrsine* and *Maesa*).

The pupa is short, and flattened anteriorly, and may be clothed with short hairs; usually, it is recumbent, and attached to a leaf at the anal end and by a median girdle, but, in some species, it is anally suspended.

The family is represented in all the continents except Australia, but it reaches its maximum development in tropical America.

Key to the Genera of RIODINIDAE

- 1 (10) Hindwing with vein 8 as long as, or nearly as long as, the cell (fig. 8g). Frons and palpi not pure white. Underside hindwing cell not entirely white.
- 2 (9) Hindwing produced at the tornus, lobed, and with a short filamentous tail at vein 1b. Eyes very finely hairy. *Dodona*
- 3 Hindwing not produced and not tailed at vein 1b.
- 4 (5) Hindwing veins 6 and 7 both arising from the cell (fig. 8g). Eyes smooth. *Zemeros*
- 5 Hindwing veins 6 and 7 stalked (fig. 9i).
- 6 (7) Hindwing angled at vein 4 (and produced to a short tail in *A. savitis* and *A. neophron*). Hindwing underside, and usually upperside also, with clearly defined, white-ringed, black, submarginal spots in spaces 4 and 5. Eyes hairy. *Abisara*
- 7 Hindwing rounded (slightly toothed at vein 2 in *L. telesia*). Hindwing without clearly defined, white-ringed, submarginal spots in spaces 4 and 5.
- 8 (9) Hindwing veins 6 and 7 stalked about 1.0 to 1.5 mm. from the end of the cell. Eyes very finely hairy. Underside ground colour carmine. *Laxita*
- 9 Hindwing veins 6 and 7 stalked from 2 to 4 mm. beyond the end of the cell (fig. 9i). Eyes smooth. Underside ground colour claret. *Tasila*
- 10 Hindwing with vein 8 very short, terminating before the end of the cell. Frons, palpi and legs pure white. Hindwing cell entirely white. Eyes smooth. *Sibogus*

Genus *Zemerus* Boisduval

Forewing apex acute in the male, and the hindwing slightly dentate at vein 4, especially in the female.

The two Malaysian species in the genus are not very closely allied, and there is some justification for separating *Z. emesoides* in the genus *Barisana* Moore.

Distributed from Sikkim to south China, and through Malaysia to the Philippines and Celebes.

Key for the separation of the species of ZEMEROS.

- 1 (2) Upperside crimson brown (paler in ♀), with minute, white, submarginal dots.
Z. flegyas
- 2 Upperside reddish brown (more ochreous in ♀), with dark brown transverse stripes.
Z. emesoides

Zemerus flegyas albipunctata Butler

Plate 44, figure 141, ♀

The Punchinello

The wings are deep crimson-brown, marked with black spots and white submarginal dots, and the forewing has a whitish subapical band, which is longer and more prominent in the female. The underside resembles the upperside, but is paler in colour. The female is paler than the male.

In the Langkawi Islands occurs the Burmese race *allica* (Fabricius), which is distinctive in that many of the black spots are outwardly edged with white, and the forewing subapical fascia is almost obsolete. The type specimen of *allica* was collected by Koenig on Pulau Salang, in peninsular Siam, in 1779, and is in the Banks collection in the British Museum.

The butterfly occurs at all elevations in Malaya, but prefers the hills. It is to be found only in well-wooded localities, and is often seen in flight quite late in the afternoon; it flies actively, and settles in a characteristic manner with the wings half open and the forewings held rather far forward.

The larva has been described as ovate and extremely flattened, pale green in colour, and covered with whitish down. When about to pupate, it attaches itself by a silken web to the underside of a leaf of the food plant (*Maesa indica* and *M. montana*). The pupa is smooth and pale green.

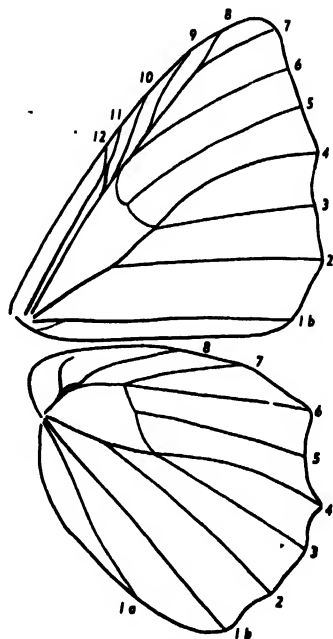


Fig. 89. *Zemerus flegyas* ♂. Venation.

The species occurs from Sikkim to the Philippines and Celebes, and is represented in the East Indian Islands by a series of well defined races.

Z. emesoides emesoides C. & R. Felder has habits similar to those of *Z. flegyas*, but is more local in distribution, being confined to Neomalaya. The wings are a rich reddish or ochreous brown, and traversed by six dark-brown bands, which are rather broader than the intervening ochreous spaces. The size and wing contours are much as in *Z. flegyas*.

Genus *Dodona* Hewitson

On the hindwing, veins 6 and 7 are stalked beyond the cell-end, except in *D. deodata* where vein 7 arises well before the cell-end. The butterflies are easily recognised as the underside is crossed by dark transverse lines which converge towards the hindwing tornus.

The insects are confined to the hills, and, although extending to Malaysia and the Philippines, the Himalayas are their headquarters. In Malaysia all the species are rare and are taken singly.

Species of *Maesa* have been reported as food plants.



Fig. 90. *Dodona egeon*. Head.

Key for the separation of the species of *DODONA*

- | | | |
|---|---|-------------------|
| 1 | (4) Underside hindwing with dark submarginal spots in spaces 4 and 5. Upperside dark brown or ochreous brown. | |
| 2 | (3) Upperside dark brown, with rather obscure whitish or ochreous spots. | <i>D. eugenis</i> |
| 3 | Upperside pale reddish brown in ♂, ochreous brown in ♀, and with black spots and stripes. | <i>D. egeon</i> |
| 4 | Underside hindwing without dark submarginal spots in spaces 4 and 5. Upperside predominantly pale greenish white. | <i>D. deodata</i> |

Dodona egeon confinis Corbet

Plate 44, figure 140, ♂

The Orange Punch

The butterfly is pale reddish brown on the upperside (more ochreous in the female), the basal third darker, and with black reticulate markings as shown in the figure. The underside is silver-washed, except below the cell of the forewing, and the light areas are rather larger than on the upperside.

This species has been found on Cameron Highlands, Fraser's Hill and Bukit Kutu at elevations above 3000 feet. The butterfly is swift in flight, and rests with expanded wings on trees and shrubs, often in rather inaccessible situations. It occurs in the hills from Sikkim to the Malay Peninsula.

D. eugenis chaseni Corbet is considerably darker than *D. egeon*, and with narrow ochreous markings, and a more extensively silver-washed underside. The only locality in Malaya where this butterfly has been found is on Gunong Tahan between 5500 and 7000 feet. It occurs in the Himalayas and in western China, and is very rare in Assam and Burma.

D. deodata *anu* Corbet, formerly recorded under the name of the Hainan race *henrici* Holland, may be known as the White Punch. On the upperside, the wings have a broad greenish-white fascia between the black-dusted basal third and the broad black apical areas of which that on the forewing bears two or three creamy-white spots. On the under surface, the ground colour is silky white, with reddish-brown transverse bands; the orange submarginal patch in space 2 on the hindwing has two black spots. The butterfly has been taken at the summits of Bukit Kutu and Kedah Peak. *D. deodata* is distributed from Assam through Malaysia to the Philippines; it appears to be extremely rare in Malaysia.

Genus *Abisara* C. and R. Felder

The forewing apex is rather quadrate, and the wings are purple-brown or crimson brown, paler in the female.

The slug-like larva is light green, with numerous short, fine hairs, and feeds on species of Myrsineae. The light green pupa is hairy, and has black dorsal spots.

Distributed throughout the Oriental Region, and also represented in tropical Africa.

(Basic literature : Bennett, 1950.)

Key for the separation of the species of *ABISARA*

- 1 (2) Upperside forewing with a prominent clear white band running from the mid costa to the tornus. *A. neophron*
- 2 Upperside forewing without such a band.
- 3 (4) Hindwing with a long, white-tipped tail at vein 4. *A. savitri*
- 4 Hindwing angled at vein 4, but without a long tail.
- 5 (5) Underside hindwing post-discal fascia evenly curved and not angled at vein 4; underside forewing post-discal fascia more or less straight throughout its length. ♂ upperside crimson brown, with the forewing apical area paler and faintly ochreous, and the hindwing with an obscure black submarginal spot in space 4. *A. kausambi*
- 6 Underside hindwing post-discal fascia distinctly angled at vein 4; underside forewing post-discal fascia evenly curved and concave towards the wing base. ♂ upperside not as above.
- 7 (8) ♂ upperside forewing with a distinct pale diffuse subapical patch; upperside hindwing with black submarginal spots in spaces 4 and 5. ♀ upperside forewing inner edge of white or whitish subapical patch sharply defined, at least in costal half of wing; upperside hindwing black submarginal spot in space 4 rounded. *A. goza*
- 8 ♂ upperside uniformly deep crimson brown, and forewing apical area not paler; upperside hindwing without black submarginal spots in spaces 4 and 5. ♀ upperside forewing inner edge of white or whitish subapical patch diffuse; black submarginal spot in space 4 elongate and with its major axis parallel to the termen. *A. saturata*

Abisara saturata kausambioides Nicéville

Plate 44, figure 142, ♀; genitalia, Plate 8, figure 106

The Malayan Plum Judy

On the upperside the male is deep crimson brown and entirely unmarked; the underside is paler, and on each wing is a pair of diffuse, pale-purplish, post-discal bands, the outer band on the hindwing with a series of black, white-edged, submarginal spots in spaces 1b, 4, 5 and 6, that in space 1b being double. In the much paler female, the forewing

has a diffuse white subapical patch, and the hindwing has black submarginal spots in spaces 1b, 4 and 5; on the underside, the transverse lines are broader and paler than in the male. In both sexes the hindwing is prominently angled at vein 4.

The insect occurs in the Langkawi Islands and throughout Malaya proper in primary forest at all usual elevations. The butterfly is usually seen resting with open wings; only on bright days is it on the wing.

Two similar species are *A. geza* and *A. kausambi*, both of which are confined to lowland forest. The male of *A. geza niya* Fruhstorfer is paler than that of *A. saturata*, and is easily recognised by the pale, somewhat obscure, subapical patch on the forewing, and the black submarginal spots in spaces 4 and 5 on the hindwing. The male of *A. kausambi kausambi* C. & R. Felder (genitalia, Plate 8, fig. 105) has the apical area of the forewing paler and faintly ochreous, and a black submarginal spot in space 4 on the hindwing. The latter species can usually be identified in both sexes by the evenly curved discal band on the underside of the hindwing, which is not angled at vein 4 as in *A. saturata* and *A. geza*.

The widespread *A. saturata* is distributed from Indo-China to Malaysia (except Java), the Philippines and Celebes, while *A. kausambi* and *A. geza* are confined to Malaysia.

In two further species of *Abisara*, *A. neophron* and *A. savitri*, the hindwing is prolonged at vein 4 to form a white-tipped tail several millimetres in length. Both butterflies are dull purple-brown. The darker species, *A. neophron chelina* (Fruhstorfer), has a prominent white subapical band on the forewing, while, in *A. savitri savitri* C. & R. Felder, this band is replaced by two diffuse sullied white transverse stripes. Both species have the black submarginal spots in spaces 4 and 5 on the hindwing separated by an orange bar. *A. neophron* is not rare on some of the hill stations, but *A. savitri* seems to be confined to the forested plains and is quite scarce. Both butterflies settle on leaves with half-open wings and are timid.

On the Battak Plateau in Sumatra occurs a species which resembles *A. savitri*, but the distal half of the hindwing is white, and the black submarginal spots are larger and prominent: this is *A. aita* Nicéville.

Genus *Laxita* Butler

The *Laxita* species are among the most beautiful of the Malayan butterflies, being carmine in colour, with the underside marked with blue-edged black spots.

The genus is remarkable for the secondary sexual characters in the male. In this sex the forewing dorsum is strongly bowed, and there is an extensive speculum in the dorsal area on the underside; on the upper-side of the hindwing is a speculum extending from the costa to the cubitus.

Nothing is known regarding the early stages. Borneo is the headquarters of the genus, which is entirely Neomalayan, except for a small extension into Siam and south Burma.

Key for the separation of the species of LAXITA

- 1 (2) Upperside forewing entirely pale carmine and unmarked, except for blackening between the veins in the basal area of the hindwing in ♀. *L. damajanti*
- 2 Upperside not unicolorous. ♂ upperside forewing only the apical area carmine and with a pale spot or band. ♀ upperside forewing carmine with the base greyish black.
- 3 (4) Underside hindwing with a prominent white marginal line in spaces 1a and 1b. Underside forewing apical area usually ochreous. ♂ upperside forewing with a white, ovate, subdorsal spot. *L. telesia*
- 4 Underside hindwing without a white marginal line in spaces 1a and 1b. Underside forewing apical area usually not prominently ochreous. ♂ upperside forewing with a pale, bluish white, oblique band. *L. orphna*

Laxita damajanti damajanti (C. and R. Felder)

Plate 44, figure 143, ♂

The Malay Red Harlequin

The rich carmine wing surfaces are unmarked above but the underside is ornamented with numerous blue-edged black spots. The female is paler than the male and has the forewing dorsum straight and not bowed as in the opposite sex. *L. damajanti* is practically confined to Neomalaya and, like the other local species of *Laxita*, it occurs on the hills up to about 4000 feet and is to be found in dense forest on bright sunny days. It is more often seen settled on a leaf than observed in flight.

In the male of *L. telesia lyclene* Nicéville (Plate 44, figure 144, ♂) the upperside is blackish brown, only the apical area of the forewing being coloured carmine, and the forewing has a shining white ovate spot below the cell. The female has the basal area of the forewing and often much of the hindwing greyish black.

In the male of *L. orphna laocoon* Nicéville, the wings are blackish brown above, with only the apical edge of the termen carmine, and the forewing has a broad oblique bluish-white band. The female resembles that sex of *L. telesia* but is smaller. Both sexes of *L. telesia* and *L. orphna* can always be separated in that, in the former species, the blue and white submarginal lines on the underside of the hindwing increase in width perceptibly towards the tornus and there is, in addition, a very distinct white marginal line in spaces 1a and 1b.

Genus Taxila Doubleday

The adults bear a superficial resemblance to those of *Laxita*, and the structural differences between the two genera are not very great. In both sexes the forewing apex is more pointed, and the male is without secondary sexual characters.

Life history unknown. Distributed from Assam to Malaysia.

Key for the separation of the species of *TAXILA*

- 1 (2) ♂ upperside black. ♀ upperside forewing with white subapical spots separated by the orange brown veins. *T. thuisto*
- 2 ♂ upperside black, with the apical area of the forewing reddish brown. ♀ upperside forewing with a diffuse, white, subapical band. *T. haquinus*

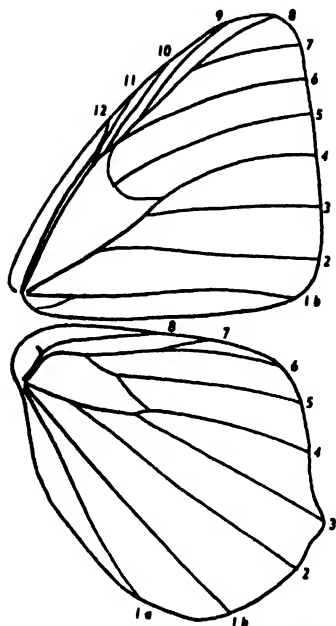
Fig. 91. *Taxila thuisto* ♂. Venation.*Taxila haquinus haquinus* (Fabricius)

Plate 44, figures 145 and 146, ♂

The Harlequin

The two species of *Taxila* bear a general resemblance to the *Laxita* forms, but the ground colour is orange brown and not carmine. In *T. haquinus*, the male is black above, with the apical area of the forewing pale reddish brown. The female is reddish brown, with a white subapical band on the forewing, and both wings studded with black spots. In both sexes the underside is reddish brown, with the black spots, which are outwardly edged with blue, arranged much as in *Laxita damajanti*.

T. thuisto thuisto Hewitson is smaller but similar to *T. haquinus*; the male is uniformly dark brown or black above, and the white subapical fascia on the forewing in the female is divided into a macular band by the reddish-brown veins.

Both species of *Taxila* are found in well-wooded districts, and appear to be more abundant in the north of the Peninsula. *T. haquinus* only has been found above 2500 feet. *T. haquinus* occurs from Assam and Burma to Malaysia, but *T. thuisto* is restricted to Burma, Siam and Neomalaya. The type specimen of *T. haquinus* was one of the butterflies collected by Koenig in 1778-1779 in Pulau Salang or Malaya.

Genus *Stiboges* Butler

The single species, which somewhat resembles a small Pierid in flight, is distributed from north India and West China to Malaya, Sumatra and Java: it appears to be absent from Borneo.

The adult is white, with the forewing costa and both termens broadly bordered with black, the distal borders having two series of small rather diffuse, white spots. The forewing termen is more rounded in the female. On the hindwing, vein 7 is very short.

S. nymphidia nymphidia Butler is a local species found only in heavy forest at moderate elevations. The life history is unknown.

FAMILY LYCAENIDAE

Blues and Hairstreaks

Over one-third of the butterfly species of the Malay Peninsula belong to the family Lycaenidae, and it is certain that more species in this family await discovery. Usually, the males are small or medium sized, with the upperside lustrous blue, purple, green, orange, brown or even white, the female duller and of more sombre colouring than the male. In most species the hindwings are furnished with delicate tail-like appendages.

Almost all the species fly only in the sunshine; many are common in villages and gardens, and by the roadside, while others never leave the shade of the primeval forest. The Lycaenidae are found at all elevations, but a very few genera are entirely montane in habit. One species, *Zizula hylax*, is circumtropical in distribution, *Lampides boeticus* is found throughout the warmer parts of the Old World, and a male was taken on the Third Mount Everest Expedition at 11,000 feet; *Zizeeria knysna* and *Zizina otis* are also found in both the African and Indo-Australian Regions. Generally speaking, however, the Malayan Lycaenids are representatives of species which are confined to the Oriental Region.

In the Lycaenidae the antennae may be clubbed or almost cylindrical. Eyes naked or with short erect hairs. Fore-legs functional in both sexes, the tarsi usually unjointed and with a single terminal claw in the male, while those of the female are jointed, and armed with two claws. Hind tibiae with only a terminal pair of spurs. In most species vein 8 is absent from the forewing, and, in a proportion of forms, vein 9 is absent also. In many genera, and especially in the Theclinae, the forewing has vein 1b weakly bifurcate at the base. Hindwing without a precostal vein, and, in many species, with one or more tails which may be short or long.

Sex dimorphism is strongly developed, and rarely is there any difficulty in determining the sex of a Lycaenid on the basis of the pattern on the upperside of the wings; occasionally, the underside pattern is entirely different in the two sexes.

Androconial scales are usually present on the upperside of the wings in the blue males in the subfamily Lycaeninae; only in one species of Theclinae (*Drina mania*) are androconial scales known. In the subfamilies Theclinae and Poritinae, the male secondary sexual characters comprise areas of specialised scales (brands), and associated hair tufts, on the upperside of both wings and on the forewing beneath. Many species of Miletinae have a pale brand along vein 4 on the forewing above, and this vein is usually thickened near its origin. There are no secondary sexual characters in the males of Liphyrinae.

The male genitalia of the Lycaenidae are characterised by the slightly hairy, blunt, bilobate uncus and the long, slender, curved,

divided gnathos (the "dorsal hooks" of many authors). In many genera and groups of allied species, the male genitalia exhibit a well marked specific differentiation and are of great importance in determination. This differentiation is most marked in the Lycaeninae and least so in the Miletinae. Little or no work has been carried out on the female genitalia of the Oriental Lycaenidae.



Fig. 92. *Arhopala apidanus*. Larva.



Fig. 93. *Arhopala apidanus*. Pupa.

The larvae are mostly onisciform (that is, shaped like a wood louse), with a retractile head, short legs, and usually naked, but they show a great diversity in form. Generally, they feed on young leaves, buds and flowers, some live in the interior of fruits, while many feed on the seed-pods of species of Leguminosae. Frequently the larvae live in association with ants. Some larvae have lip-like openings on one of the posterior segments from which the ants obtain a sweet liquid by application of certain stimuli. Cases are known in which the larvae are driven or carried by the ants into their nests, and here they are fed by their hosts and remain until the adult stage. Again, in some genera, the larvae are carnivorous, the larva of *Miletus boisduvali* feeding on aphids, and that of *Spalgis epeus* preying on coccids. The association existing between ants and Lycaenid larvae is a widespread phenomenon having many facets; it is a fascinating subject well worthy of much further observation and study.

The pupae are mostly short, stout and anteriorly rounded, usually suspended by the cremastral hooks, and with a medium girdle, but in some species the pupa lies on the surface of the ground, or forms a weak cocoon just below the surface. The pupa is usually naked, but may be covered with short hairs or bristles.

The few records of migratory flights of species of Lycaenidae mostly refer to Ceylon and south India. The species so recorded include *Castalius rosimon*, *Neopithecops zalmora*, *Chilades lajus*, *Lampides boeticus*, *Deudorix epijarbas* and *Bindahara phocides*, and some of these have been observed flying in company with such butterflies as *Papilio polytes* and *Catopsilia pomona*.

Representatives of the Lycaenidae are found almost everywhere where butterflies occur throughout the world.

Key for the separation of the Subfamilies of LYCAENIDAE

- 1 (2) Hindwing vein 8 very short, not more than half the length of vein 1b on the forewing (fig. 94). Hindwing usually with a trace of a precostal vein. *Poritinae* (page 259).
- 2 Hindwing vein 8 as long, or nearly as long, as vein 1b on the forewing (fig. 100). Hindwing without a trace of a precostal vein.

- 3 (4) Legs abnormal, either the tibiae or tarsi peculiar or elongate (figs. 95 and 97). Abdomen longer than the hindwing dorsum. *Miletinae* (page 264)
- 4 Legs normal (fig. 122) (except in *Taraka*, in which the fore tibiae are thickened in the middle). Abdomen shorter than the hindwing dorsum (except in *Spalgis*, *Pithecopis*, *Neopithecopis*, *Everes*, *Zizeeria*, *Zizina* and *Zizula*).
- 5 (6) Antennal club rather abrupt, somewhat flattened and spatulate, and may be hollowed beneath (antennal club more gradual and cylindrical in *Spalgis* and *Taraka*). Hindwing rounded or produced, with or without a short filamentous tail at vein 2, but without a lobe between veins 1a and 1b. (fig. 100). *Lycaeninae* (page 270)
- 6 Antennal club gradual and cylindrical (except in *Chliaria*, where it is abrupt, flattened and somewhat spatulate).
- 7 (8) Body slender. Hindwing usually with a lobe between veins 1a and 1b and tailed, the tails usually longer and wider than in *Lycaeninae* (fig. 126). Forewing vein 8 absent (except in males of *Iraota*, *Amblypodia*, three species of *Jacoona* and *Pratapa vidua*, and sometimes in females also of the last-named species), and vein 7 arising from the cell (except in *Thecla*). Forewing less than 30 mm. *Theclinae* (page 305)
- 8 Body very stout. Hindwing lobed but tailless. Forewing all veins present, and veins 7, 8 and 9 arising from vein 6 (fig. 137). Forewing longer than 30 mm. Resembles a large Hesperiid or a moth. *Laphyriinae* (page 364)

Subfamily PORITIINAE

(Plate 27)

Adults of moderate size. Antennal club gradual and cylindrical. Eyes and palpi smooth. Abdomen shorter than the hindwing dorsum. Forewing with veins 11 and 12 completely anastomosed, except for the basal portions, in all genera, except *Cyaniriodes*, where vein 11 is first anastomosed with vein 10 and then with vein 12; vein 5 nearer vein 6 than vein 4 at their origins, and veins 6 and 7 arising from a point. Hindwing tornus rounded, termen crenulate and often excavate above vein 4, and without lobe or tails.

Sex dimorphism is shown in all genera. Above, the males are brilliantly coloured green or blue, while the females are variously coloured, and, usually, broad black borders are present. The underside pattern is very characteristic in *Cyaniriodes* and *Poritia*, comprising closely set fasciae; in *Simiskina* and *Deramas*, the usual post-discal lines and submarginal fasciae are present.

Secondary sexual characters are present in the males of all genera except *Deramas*, and consist essentially of a recumbent hair-tuft overlying one or more brands in or near the cell on the upperside of the hindwing.

The male genitalia are rather uniform in design; the usual "dorsal hooks" are present, the inner edge of the valva is produced to form a long arm, or *style*, and, usually, the stout aedeagus is furnished with spine-like cornuti.

Neomalaya is the centre of distribution of the subfamily, although representatives are found in all the lands between Assam and the Philippines and Celebes. All the species are rare in the Malay Peninsula. They are mostly found on the forested plains, where they are taken singly, usually early in the day, and it appears that they fly only in bright sunshine. They prefer to settle some feet from the ground. Of all species of Poritiinae the life history is entirely unknown.

(Basic Literature: Corbet, 1940f.)

Key for the separation of genera of PORITINAE

- 1 (2) Forewing veins 8 and 9 absent, and vein 11 anastomosed first with vein 10 and then with vein 12. Underside white, with the markings comprising transverse series of spots and stripes. *Cyaniriodes*
- 2 Forewing vein 8 present or absent, vein 9 present, and veins 11 and 12 completely anastomosed except for the free basal portions (fig. 94).
- 3 (6) Forewing vein 8 absent.
- 4 (5) Underside buff, with closely set, transverse, catenulate bands filled in with brown or reddish brown. ♂ upperside hindwing with a pencil of hairs along the dorsum. *Poritia*
- 5 Underside brown or ochreous, with a post-discal band and submarginal fasciae. ♂ upperside hindwing without a dorsal hair pencil. *Simiskina*
- 6 Forewing all veins present. Underside marked as in *Simiskina*, but with an orange-crowned black spot in space 1b on each wing (faint in ♀). *Deramas*

Genus *Cyaniriodes* Nicéville

A single representative. The secondary sexual characters in the male comprise a recumbent hair tuft overlying a brand in the hindwing cell below the radius, and a second upturned tuft near the base of the cell.

The male of *C. libna andersonii* (Moore) (Plate 27, figure 1) is a clear, shining green, with uniform black borders on both wings, and a black spot at the end of the cell on the forewing. The pale bluish white female

(Plate 27, figure 3) has very broad black borders. The underside is white, with narrow, dark brown catenulations across the wings, and with some reddish brown sagittate spots in the discal areas. The butterfly is very rare in lowland forest in Malaya proper; abroad, the species is known from Mergui, south Burma, and Borneo.

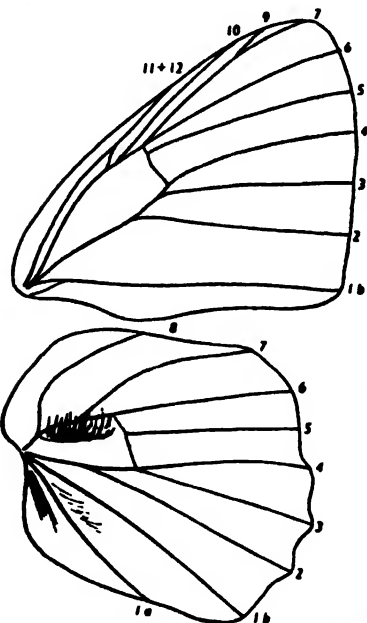


Fig. 94. *Poritia erycinoides* ♂. Venation.

Genus *Poritia* Moore

In the male, the wings above are shining blue or green, with a broad black apical border on the forewing, or black with greenish blue streaks and spots. The female is blue, purple or orange, with broad black bordering. The butterflies exhibit considerable individual variation and the status of some forms is still uncertain.

On the hindwing above, the male has a recumbent hair tuft overlying an oval brand below the radius in the cell, an oval brand near the base of space 7, and a pencil of hairs along the dorsum.

The male genitalia cannot be used to separate species with similar wing patterns. Nothing is known of the life history*.

* See Appendix, p. 494.

Distributed from south Burma to Malaysia and the Philippine Islands.

Key for the separation of the species of *Poritia*

- 1 (4) Underside forewing catenulate bands evenly distributed.
- 2 (3) ♂ upperside forewing cell entirely black. ♀ upperside purple, with rusty red submarginal streaks. *P. sumatrae*
- 3 ♂ upperside forewing with a blue basal streak in the cell. ♀ upperside brownish black, sometimes with a narrow, obscure, orange patch on each wing. *P. philota*
- 4 Underside catenulate bands not evenly distributed, wider apart especially in the discal areas.
- 5 (6) ♂ upperside shining blue (not green), with prominent blue subapical spots on the black border. ♀ upperside orange, with broad black borders. *P. erycinoides*
- 6 ♂ upperside shining green, or shining blue with a greenish reflection. ♀ upperside pale purplish blue.
- 7 (8) ♂ upperside blue (shining green by reflected light); forewing distal portion of the cubitus broadly blackened. ♀ upperside forewing black border extending into the distal end of the cell, and with small blue subapical spots. *P. pleurala*
- 8 ♂ upperside shining green (pale coppery green by reflected light); forewing cubitus not blackened. ♀ upperside forewing with a black spot at the cell end, and an obscure orange brown area on the black border in spaces 2, 3 and 4; underside ground duller and bands fainter than in *P. pleurala*. *P. promela*

Poritia sumatrae sumatrae (C. and R. Felder)

Plate 27, figures 7♂, 8 and 9♀; Plate 44, figures 147 and 148♂;
genitalia, Plate 8, figure 107

The Sumatran Gem

Above, the male is a brilliant shining green, blue in a sidelight, with a very broad, black, costal border on the forewing. The female is pale reddish purple, with narrow black borders, and a series of orange-red submarginal streaks on both wings. The underside is buff, with closely set, rather narrow, orange-brown catenulate bands across the wings; on both wings there is an orange-crowned black submarginal spot in space 1b.

Although not common, *P. sumatrae* is the least rare of the Malayan species of *Poritia*, and is found in lowland forest. It appears to fly rather early in the day. Nothing is known regarding the early stages. The species is distributed from south Burma to Neomalaya.

Like *P. sumatrae*, *P. philota philota* Hewitson has the catenulate bands on the underside evenly spaced. Above, the male is shining greenish blue, with large black spots and streaks on the forewing, and a broad black costal border on the hindwing; the female is dark brown, and may have a narrow dull orange discal area on each wing. The underside is earthy brown with darker bands in the male, and pale buff with ochreous bands in the female. The species ranges from south Burma to Neomalaya, Nias and the Philippines.

The male of *P. pleurala pleurala* Hewitson resembles that sex of *P. sumatrae* above, but the forewing cell is mostly blue, and not entirely black as in *P. sumatrae*. The female is pale purplish blue, with a greenish tinge in a sidelight, and with black costal and distal borders on the forewing; the hindwing has black submarginal spots inwardly margined

by a pale blue sinuate line. On the underside the catenulate bands are not evenly spaced, the interspaces being broader in the distal halves of the wings. The species occurs from the Karen Hills, in Burma, to Malaysia, and is found in lowland forest in the Peninsula. The closely allied *P. promula* flies in Malaya, Sumatra and Java, and appears to be restricted to the mountains. *P. promula elegans* Fruhstorfer (Plate 27, figure 133) has the upperside shining green in the male, and the pale purplish female is easily recognised by the black cell-end spot on the forewing, and the dull, reddish underside.

P. erycinoides phraatica Hewitson (Plate 27, figures 10 and 11 ♂, 12 ♀) has the uneven spacing of the underside bands as in the last species, and this surface is almost chalky white. On the upperside the male is bright blue, with black markings along the costal and distal margins of the forewing, and the costa broadly black-bordered on the hindwing. The female is blackish brown, with an orange patch on the forewing, and a narrow orange streak on the hindwing. Ranges from Assam and Burma to Malaysia.

Genus *Simiskina* Distant

The wing pattern of the male is similar in most species, but identification of the females is easy.

On the hindwing above, the male has a pale buff or pale yellow speculum in the costal third, and there is a corresponding nacreous dorsal area on the forewing beneath. Also on the upperside of the hindwing is a recumbent hair-tuft overlying an oval brand in the cell below the radius, and a second oval brand in space 7. In all species except *S. philura*, there is, on the hindwing, a small elongate brand above the origin of vein 4, overlying which is a small and sparse hair-tuft.

The male genitalia are rather uniform throughout the genus and are quite similar to those of *Poritia*; they are of little diagnostic value, although *S. pediada* and *S. philura* can be separated on the relative size of the aedeagus, this organ being much larger in the former species. (See Plate 8, fig. 108.)

The genus is distributed from Assam to Neomalaya.

Key for the separation of the species of *SIMISKINA*

- 1 (2) Underside forewing with a broad, white, post-discal band increasing towards the dorsum. *S. phalaena*
- 2 Underside forewing without such a band.
- 3 (4) Underside hindwing tornal area whitened, broadly so in ♀. *S. pheretia*
- 4 Underside hindwing tornal area not whitened.
- 5 (6) Underside hindwing with a greenish blue submarginal line extending from the tornus to vein 4. *S. pharyx*
- 6 Underside hindwing without blue scaling.
- 7 (12) Underside buff brown or purple-brown.
- 8 (9) Underside uniform pale buff brown, faintly ochreous in ♀; markings rather faint. *S. pasina*
- 9 Underside deep purple-brown in ♂, pale ochreous buff with a reddish hue in ♀; both sexes purple washed.
- 10 (11) ♂ underside forewing termen not conspicuously paler than the rest of the wing. ♀ upperside dark brown with a faint purple tinge. *S. daturpi*

- 11 ♂ underside forewing termen conspicuously paler than the rest of the wing. ♀ upper-
side orange, with a dark brown distal border, which may be continued along the
dorsum. *S. phalia*
- 12 Underside brick-red or deep yellow.
- 13 (14) Underside brick-red, with an ochreous hue. Underside hindwing without a white
spot in space 6. *S. potina*
- 14 Underside deep yellow, with a reddish hue. Underside hindwing with a prominent,
white, post-discal spot in space 6. *S. philura*

***Simiskina phalia potina* (Hewitson)**

Plate 27, figures 19 and 20 ♂, 21 ♀; Plate 44, figure 149 ♂, 150 ♀

The Blue Brilliant

In the male the wings above are black, with shining greenish blue markings which comprise a streak below the forewing cell, streaks along the dorsum on the forewing and hindwing, and some post-discal and submarginal spots. The female has the upperside orange, with a dark brown distal border (which broadens towards the apex), on the forewing; occasionally, this border is continued broadly along the dorsum. The under surface is purple brown, more orange in the female, with the basal two-fifths darker, and with a reddish brown post-discal fascia on each wing.

S. phalia is the least uncommon of the Malayan species, and is found in lowland forest; it is distributed from the Karen Hills in Burma to Neomalaya.

S. pharyge deolina (Fruhstorfer) (Plate 27, figures 16♂, 17 and 18♀) is smaller than *S. phalia*, but the male is similar on the upperside. The underside is pale hair-brown, slightly ochreous in the female, with narrow, rather obscure post-discal lines, which are outwardly pale-edged, and catenulate on the hindwing; the distal margin of the hindwing is edged with metallic greenish blue scaling in the tornal area. On the upperside, the female is uniformly coloured dark brown.

S. phalena phalena (Hewitson) (Plate 27, figure 2) can be readily recognised by the white or whitish discal band across both wings on the underside. The male above resembles *S. phalia*, but the hindwing speculum is deeper yellow; the female has a prominent white discal spot on the forewing, and there are pale green post-discal spots on both wings. Both *S. pharyge* and *S. phalena* occur from south Burma to Neomalaya, and the latter species is found also in Nias.

S. philura elioti Corbet (Plate 27, figure 14♀) is easily recognised by the ochreous yellow underside, with the usual sinuate post-discal line, and white post-discal spots in spaces 6 and 7 on the hindwing. Like *S. phalena*, the male has a decidedly yellow speculum on the hindwing above, while the orange female has the black bands and stripes arranged in a manner somewhat suggestive of an orange *Neptis* species. Until its recent discovery in Johore by Cowan and Eliot, *S. philura* was known only from Borneo.

Genus *Deramas* Distant

(Plate 27, figures 4-6.)

In this genus, the male is without secondary sexual characters.

D. livens livens Distant is rather rare in Malaya, but generally distributed at elevations up to about 3500 feet. In the male the upperside is shining bluish green; the forewing has broad black costal and distal borders, and an oblique black stripe running across the green ground from the base of space 1a to join the black border in space 2; the hindwing has a broad, black, costal border and a narrower black dorsal border. The female is purple, with rather regular black borders on both wings, and a spot at the cell-end on the forewing. The underside is hair-brown, with rather faint pale-edged post-discal lines, and an orange-crowned black submarginal spot in space 1b on each wing, these spots being very faint in the female.

The species occurs from Burma to Malaysia, the Philippines and Celebes.

Subfamily MILETINAE

Delicate and dark coloured butterflies, found only in heavy forest, weak in flight and unobtrusive in habit. They fly about shrubs and bushes, usually a little above eye-level, and remain settled for long periods.

Antennae cylindrical, with the club gradual and ill-defined. Palpi with the third segment smooth, laterally compressed, and as long as, or nearly as long as, the second segment. Eyes smooth. Legs abnormal, having the first segment of the tarsi elongate in *Miletus* and *Allotinus*, and the tibiae thickened in *Logania*. Wings narrow and elongate, upperside usually dark brown, but white or with a whitish fascia on the forewing in some species. Hindwing rounded, without tails or lobe, but crenulate in the female in *Miletus* and *Allotinus*.

The male has sub-anal hair tufts on the ventral surface of the abdomen in all species, and alar secondary sexual characters are present in most.

The male genitalia are characterised by the large paired uncus plates, each with a ventral hook (corresponding to the gnathos), and the comparatively small valvae and aedeagus.

The details of the early stages are known only in *Miletus boisduvali*, which was bred in Hong Kong by Kershaw. The eggs are laid among aphids, on which the larvae feed; the aphids are associated with species of ants, which, however, adopt a neutral attitude towards the predatory *Miletus* larvae.

The species of Miletinae appear to be unusually restricted in habitat, certain species being found in precisely the same locality, which may be confined to a few square yards, year after year.

The subfamily occurs only in the Indo-Australian Region.

Key for the separation of the genera of MILETINAE

- 1 (4) Legs very long.
- 2 (3) Tarsi with first segment elongate, strongly compressed and almost spatulate (fig. 95.)
Underside brown or ochreous brown, with series of macular markings on the hindwing. *Miletus*
- 3 Tarsi with first segment elongate and almost cylindrical (fig. 97). Underside white or greyish, and densely sprinkled with dark brown dots and striae to form an obscure pattern. *Allotmus*
- 4 Legs not remarkably long; tarsi normal, but the tibiae are outwardly thickened. Underside irregularly marbled or variegated. *Loganus*

Genus *Miletus* Hübner

Except *M. gaesa* and *M. archilochus* all the Malayan species have a white fascia on the forewing above, while the hindwing is mostly whitish in *M. symethus*, and entirely white in the race of *M. ancon* from Malaya proper.

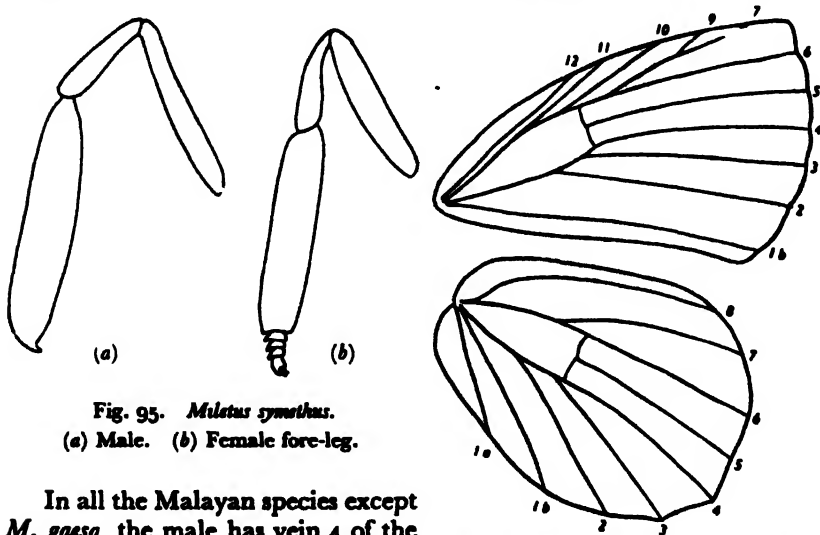


Fig. 95. *Miletus symethus*.
(a) Male. (b) Female fore-leg.

Fig. 96. *Miletus symethus* ♀. Venation.

In all the Malayan species except *M. gaesa*, the male has vein 4 of the forewing thickened at the base. In *M. archilochus* the male has also a pale straw-coloured sex stripe along vein 4 on the forewing above.

In general, the male genitalia show little specific differentiation. The valva is leaf-like and the aedeagus only slightly tapering in *M. heracleion*; in *M. zinckenii*, *M. symethus*, *M. ancon* and *M. gallus* the valva terminates in a broad blunt hook, and the comparatively broad aedeagus is only slightly curved; in the remaining species the valva terminates in a broad lobe, with a small apical hook, and the finely pointed aedeagus is more strongly curved. (See Plate 8, figs. 109, 110.)

Distributed from Burma to south China, and through the Archipelago to Papua.

(Basic literature: Corbet, 1939a; Kershaw, 1903.)

Key for the separation of the species of *Miletus*

- 1 (4) Upperside forewing without a prominent white discal area.
- 2 (3) Upperside dark brown and unmarked, but, occasionally, the female has faint indications of a pale discal fascia on the forewing. *M. gessa* (14.0-15.5 mm.)
- 3 ♂ upperside uniform dark brown, with a pale straw-coloured sex stripe along vein 4 on the forewing. ♀ upperside forewing with an obscure and diffuse discal band comprising separated straw-coloured spots arranged as in *M. boisduwali* ♂. *M. archilochus* (15.5 mm.)
- 4 Upperside forewing with a prominent white discal band, which, in some species, extends to the base of the wing.
- 5 (6) Upperside forewing cell entirely brown. ♂ upperside forewing discal band narrow and diffuse, comprising separated spots in spaces 1b, 2 and 3, the last extending into spaces 4 and 5. ♀ upperside forewing with the outer edge of the discal band regularly curved and convex towards the termen. *M. boisduwali* (14.0-15.0 mm.)
- 6 Upperside forewing cell partially white.
- 7 (10) Upperside forewing with the outer edge of the white discal area not right-angled at vein 3.
- 8 (9) Upperside forewing white discal band comparatively narrow and rather elliptical. *M. biggsii* (16.0-17.5 mm.)
- 9 Upperside forewing white discal area extending to the base of the wing; upperside hindwing dark brown. *M. zinckeni* (16.0-17.0 mm.)
- 10 Upperside forewing with the outer edge of the white discal area right-angled at vein 3, and the white area in spaces 1b and 2 extended towards the termen.
- 11 (14) Upperside forewing with almost the entire basal half of the wing pure white.
- 12 (13) Upperside hindwing costal area dark brown, and the discal area whitened on a dark grey ground. *M. symethus* (17.0-18.0 mm.)
- 13 Upperside hindwing entirely white, except for the narrowly blackened costal area. *M. ancon* (21.0-22.0 mm.)
- 14 Upperside forewing with the white area restricted to the discal band.
- 15 (16) Underside forewing with the white spot in space 1b not separated from the upper portion of the discal band. *M. gallus* (16.5-18.0 mm.)
- 16 Underside forewing with the white spot in space 1b separated from the upper portion of the discal band. *M. heracleon* (17.5-18.0 mm.)

Miletus biggsii biggsii (Distant)

Plate 44, figures 151 and 152, ♀

Biggs' Brownie

M. biggsii is dark reddish brown above, with an oblique white discal band on the forewing, and the apical area beyond the band somewhat blackened. The underside is pale greyish brown, with a slight ochreous hue. The forewing beneath has the white discal band much as above, and the whitish-edged spots, which are only slightly darker than the ground, are confined to the apical and basal portions of the wing; on the hindwing are basal, discal and post-discal series of catenulate spots. The female has the hindwing distinctly toothed at vein 4.

M. biggsii is not uncommon in the forested plains of Malaya proper. Nothing is known concerning its life history. The species is distributed from Assam and Burma through Malaysia to the Philippines.

In the rare *M. boisduwali xeragis* (Fruhstorfer), the sexes are dissimilar. In the male the forewing discal band is narrow, diffuse, dark dusted, and divided into several portions. The female resembles that sex of *M. biggsii*, but, in both sexes of *M. boisduwali*, the forewing cell is entirely brown. The species occurs from India and China through the Archipelago to New Guinea. It is the only species of *Miletinae* of which the early stages are known. The eggs are laid among a heap of

aphids, and adhere to the bodies of the victims. The young larva is cylindrical, but later becomes louse-shaped, when it is greenish yellow with purple-brown stripes. It lives among the aphids and feeds on them. In Hong Kong two species of ants, *Polyrachis dives* Smith and *Dolichoderus bituberculatus* Mayr, were associated with the aphids and milked them, but appeared to be indifferent to the presence of the *Miletus* larvae or imagines.

The *Miletus* species with a white discal area on the forewing remaining to be mentioned are easily distinguished by the outer edge of the white area being right-angled at vein 3.

M. gallus gallus (Nicéville), which is restricted to Malaya and Sumatra, otherwise closely resembles *M. biggsii*. In *M. symethus diopetithes* (Fruhstorfer), which is probably the commonest species after *M. biggsii*, the white area extends practically to the base of the forewing in the female, although the wing base is more broadly darkened in the male. Both sexes can be distinguished by the whitened area below the subcostal vein on the hindwing above. The female is commoner than the male. Distributed from Assam and Burma through Malaysia to the Philippines.

M. ancon gigantes (Nicéville) has the upperside almost entirely white, except for the black apical area on the forewing, and occurs in Malaya proper (on the hills as well as on the plains), and in north-east Sumatra. The Bornean subspecies of *M. ancon* is nearer to typical *ancon* (Doherty), from Burma, than to *gigantes*.

At first glance *M. gaesa gaesa* (Nicéville) might be mistaken for an *Allotinus*, as the wings are unicolorous above in both sexes. The species is not uncommon on the forested plains in Malaya, and occurs also in Indo-China and Sumatra.

Genus *Allotinus* C. and R. Felder

Wings dark brownish above, except in *A. subviolaceus*, in which the forewing is greyish blue. The whitish underside is densely flecked with dark reddish brown streaks and dots, and the more prominent markings form, somewhat obscurely, the usual Lycaenid pattern of subbasal (hindwing only), cellular, post-discal and submarginal spots.

In all the Malayan species except *A. subviolaceus*, the male has, on the forewing above, a pale oval elongate brand along vein 4, and the basal portion of this vein is thickened. The brand is of considerable diagnostic value in the species of the *fabius* group.

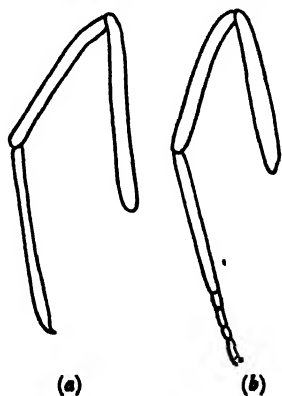


Fig. 97. *Allotinus unicolor*.
(a) Male. (b) Female fore-leg.

In general, the pattern of the male genitalia shows specific differentiation, and the shapes of the valva and aedeagus are important aids to identification in the *fabi* group. The contour of the uncus, however, is subject to much individual variation, particularly in *A. unicolor* and *A. horsfieldi*. (See Plate 8, figs. 111–115; Plate 9, figs. 116–119.)

The genus is found almost throughout the Oriental Region, except Ceylon and south India, and most strongly represented in Neomalaya.

(Basic literature: Corbet, 1939c.)

Key for the separation of the species of *ALLOPINUS*

- 1 (2) Upperside forewing with the basal area broadly greyish blue. *A. subviolaceus* (12.0–15.0 mm.)
- 2 Upperside forewing brown.
- 3 (4) Underside hindwing with a prominent black spot at the mid costa. Underside with feeble striations. *A. nivalis* (9.0–11.5 mm.)
- 4 Underside hindwing with the spot at the mid costa not more prominent than other spots. Underside more or less densely striate, and the following markings can usually be distinguished; two cell spots and a more prominent cell-end spot on each wing, two or three costal spots in the basal half of the hindwing, a series of post-discal spots forming an irregular band on both wings (the spot in space 6 on the hindwing moved inwards), and a series of interneural, submarginal spots.
- 5 (10) Underside terms and forewing apex not darkened; wings without black submarginal dots.
- 6 (9) Underside forewing post-discal fascia more or less evenly curved and not broken or sharply angled at vein 4. Underside hindwing post-discal spot in space 6 situated almost midway between the spot in space 7 and the cell-end spot.
- 7 (8) Underside forewing post-discal fascia prominent and not moved inwards in the dorsal half of the wing; striations normal. Hindwing with minute teeth at the vein endings. ♂ brand narrow, rectangular and pale. *A. unicolor* (12.0–16.0 mm.)
- 8 Underside forewing post-discal fascia feeble and conspicuously moved away from the tornus: dense reddish brown striations. Hindwing teeth hardly visible. ♂ brand longer, slightly broader and more diffuse than in *A. horsfieldi*.
- 9 Underside forewing post-discal fascia sharply angled or broken at vein 4 and the upper portion oblique, the fascia comprising rather broad and conjoined streaks. Underside hindwing post-discal spot in space 6 close to, or contiguous with, the spot in space 7. ♂ brand long, broad, oval and rather pale. *A. apries* (18.0–19.0 mm.)
- 10 Underside terms and forewing apex distinctly darkened; wings with a series of black, interneural, submarginal dots, which are outwardly whitened. (*fabi* group)
- 11 (12) Underside post-discal markings above vein 4 on the forewing and above vein 6 on the hindwing coalesced to form bands which extend almost to the terms. Underside pale reddish white in ♂, white in ♀ with strongly contrasted reddish brown markings. ♀ hindwing strongly caudate at vein 4. ♂ brand long, narrow, rather obscure and only slightly paler than the ground. *A. fabius* (16.0–18.0 mm.)
- 12 Underside post-discal markings normal.
- 13 (18) ♂ brand not nearly reaching the termen. ♀ hindwing not strongly caudate at vein 4.
- 14 (15) Underside almost white, markings faint and, usually, the post-discal fascia very obscure. ♂ brand slightly longer and broader, but more diffuse and obscure than in *A. unicolor*. *A. taras* (14.0–15.5 mm.)
- 15 Underside not as above, although ♀ often resembles *A. taras* ♀.
- 16 (17) Underside pale reddish brown in ♂, pale reddish white in ♀, but with post-discal fasciae obscure in both sexes. ♂ brand rather long, narrow, rather diffuse, and hardly paler than the ground. *A. panormis* (16.0–16.5 mm.)
- 17 Underside pale reddish white with a distinct ochreous hue, and post-discal markings prominent and lunulate on both wings. ♂ brand short, broad, diffuse and much paler than the ground. *A. strigatus* (15.5–16.0 mm.)
- 18 ♂ brand very long (nearly reaching the termen), rather broad, pale and diffuse. ♀ hindwing strongly caudate at vein 4. Underside striations becoming denser towards the terms, and the post-discal markings hardly visible. *A. borneensis* (18.5–20.0 mm.)

Allotinus unicolor unicolor C. and R. Felder**Plate 44, figure 153, ♂****The Lesser Darkie**

The male upperside is dark brown, and the underside greyish white, with moderately dense reddish-brown striations. The male can be recognised by the pale obovate band in the discal area of the forewing above, while the female has the forewing less pointed, the hindwing dentately sinuate and is reddish-brown on the upperside.

The larva has been found feeding on the inflorescence of *Mangifera indica*, otherwise nothing appears to be known concerning the life history of any species of *Allotinus*.

A. unicolor dilutus Corbet is the commonest *Allotinus* in Malaya, where it is found in lowland forest. The butterfly is local, and, where it occurs, it is usually found in some numbers. In the rare aberration *suka* Piepers the underside is without striations and the usual markings are replaced by reddish-grey spots. The type specimen of *A. unicolor unicolor* was taken in Singapore by Wallace. This race is confined to Singapore Island; and in it the under surface is appreciably whiter than in examples from the Malayan mainland. The species is distributed from south Burma to Malaysia and Lombok.

A. horsfieldi vadosus Corbet (Plate 44, figure 154, ♂) is larger and has a darker and more densely striate underside than *A. unicolor*; it is only slightly less common and is found in the same situations. It differs from this latter species in the sharply angled or broken post-discal fascia on the forewing beneath. *A. horsfieldi* occurs from Assam and Burma to Malaysia, the Philippines and Celebes.

Of the species of the *fabi* group, in which, on the underside, the forewing apical area and the terminals of both wings are distinctly darkened, *A. taras taras* (Doherty) is the most abundant and occurs in lowland forest, while the rather similar *A. panormis fruhstorferi* Corbet is confined to the hills. *A. fabius arrius* Fruhstorfer has the markings in the apical areas coalesced to form prominent dark bands, while the rather large *A. borneensis elioti* Corbet has the striations denser and redder than in other species.

A. nivalis substrigosa (Moore) is the smallest member of the genus, and is easily recognised by the feeble striations on the under surface, and the black spot in the centre of the costa on the hindwing. The butterfly is widely distributed at the usual elevations, but is nowhere common: it occurs from south Burma to Malaysia and the Philippines, but the black costal spot on the hindwing beneath is obsolete in Borneo and the Philippines.

Another somewhat aberrant species is *A. subviolaceus alkamah* Distant, with the greyish-blue forewing broadly bordered with dark brown. The butterfly is quite rare on the plains and females appear greatly to outnumber males.

Genus *Logania* Distant

The small butterflies in this genus are rather moth-like in appearance. The forewing is white or whitish above, with broad blackish brown bordering, and the hindwing may be white or dark brown; the under surface is irregularly marbled or variegated. The basal portion of vein 4 on the forewing is slightly thickened and darkened in the males of *L. marmorata* and *L. massalia*, and, except in the last-named species, the sexes are alike.

The male genitalia show the usual characters of the Miletinae; the valvae of *L. marmorata* (Plate 9, fig. 120) and *L. massalia* are similar, although those of the other species are quite distinct.

The genus is distributed from Assam to Papua.

L. malayica malayica Distant is the commonest Malayan representative of the genus and, like *L. regina sriwa* Distant, has the upperside almost entirely white, except for the rather broad, black, apical border on the forewing. The pointed forewing apex, however, readily separates *L. malayica* from any other species in the genus.

The *Logania* species are very local, and are found flying around bushes in lowland primary forest. All are quite uncommon.

(Basic literature: Corbet, 1940c.)

Key for the separation of the species of LOGANIA

- 1 (2) Forewing apex prolonged to a point. Legs unicolorous dark brown. *L. malayica*
- 2 Forewing apex not pointed. Legs brown and ringed with white or buff.
- 3 (4) Underside hindwing with a broad white streak from the base to the termen. *L. regina*
- 4 Underside hindwing without a prominent white streak.
- 5 (6) Forewing termen crenulate. Underside marbled with black and white and various shades of dark brown and ochreous; post-discal fascia on the forewing not discernible. *L. marmorata*
- 6 Forewing termen entire. Underside pale rusty ochreous brown, faintly striated; the usual cell-end stripes and post-discal fasciae can be faintly discerned. *L. massalia*

Subfamily LYCAENINAE

Adults small to moderate in size. Usually low-flying, and many species favour open country. As a general rule, numbers of the same species are taken together, the males often found congregated at moist spots on the road.

The male is usually blue or purple-blue above, with narrow black borders, and a few tornal spots on the hindwing; the female is darker, with broader black borders, a pale discal patch on the forewing, and a series of submarginal spots on the hindwing. Underside usually grey, with dark spots or streaks comprising cell-spots, series of post-discal spots and submarginal and marginal markings, and, on the hindwing, there are also spots in the basal area. Usually, the submarginal spot in space 2 on the hindwing is enlarged, ornamented with a few green metallic scales, and crowned with orange. It is characteristic of the Malaysian races of Lycaenidae that this orange crowning is more

extensive than in the corresponding subspecies from the Asiatic mainland north of Malaya.

In *Jamides*, the *Nacaduba* group and *Anthene*, the markings beneath consist of pale transverse striae, which are aligned to form transverse lines and bands. In a few genera, such as *Tarucus* and *Taraka*, the underside markings take the form of dark spots.

The males are without secondary sexual characters, except that in species with the upperside blue or purple-blue androconial scales may be present; in many species these have a high diagnostic value.* In general, the male genitalia show considerable differences between allied species, and constitute a most valuable means of absolute identification. The similarity between closely related females, combined with their rarity, makes identification of individuals of this sex very difficult, and this is particularly so in *Celastrina*, *Jamides* and *Nacaduba*.

The differences between genera are often not clearly defined, and it is doubtful how far the separation of such genera as *Catopyrops*, *Petrelaea*, etc., can be justified. Apart from separating *Lycaenopsis* and *Celastrina*, we have not followed Toxopeus in further subdividing this group.

Key for the separation of genera of LYCAENINAE

- 1 (48) Forewing vein 7 arising well before the end of the cell (fig. 100). Underside not yellow or orange.
- 2 (5) Antennal club abnormal, rather gradual, cylindrical and not hollowed beneath. Eyes smooth. Forewing veins 11 and 12 free (figs. 98 and 99). Hindwing tailless.
- 3 (4) Legs normal and fore tibiae not clothed with long hair-scales. Underside with fine, dark striations. *Spalgis*
- 4 Fore tibiae incrassate in the middle, and clothed with long, fluffy hair-scales. Underside white with brown or black spots. *Taraka*
- 5 Antennal club abruptly formed, flattened and spatulate and hollowed beneath.
- 6 (11) Underside forewing with a dark streak running from the base below the costa.
- 7 (10) Hindwing with a filamentous tail at vein 2. Eyes smooth or slightly hairy. Underside with black spots and stripes.
- 8 (9) Forewing veins 11 and 12 shortly anastomosed, or touching, and then free to the costa (fig. 100). *Castalius*
- 9 Forewing veins 11 and 12 free but approximate *Tarucus*
- 10 Hindwing tailless. Eyes densely hairy. Underside with the upper portion of the post-discal fasciae on both wings outwardly shaded with dark brown (except in *N. asiaticus*). *Niphanda*
- 11 Underside forewing without a dark basal streak.
- 12 (15) Hindwing tornus evenly rounded. Underside white, basal and discal areas unmarked, and a large black circular subapical spot on the hindwing. Eyes smooth.
- 13 (14) Forewing veins 11 and 12 anastomosed for part of their lengths (fig. 101). Underside forewing with a small black spot in each of spaces 9 and 10. *Rithecops*
- 14 Forewing veins 11 and 12 free throughout. Underside forewing without black costal spots. *Neopthecops*
- 15 Hindwing tornus angled.
- 16 (31) Hindwing tailless.
- 17 (22) Forewing veins 11 and 12 free (figs. 103 and 104).
- 18 (19) Eyes large and smooth. Underside white and unmarked except for marginal fasciae. *Lycaenopsis*
- 19 Eyes usual size. Underside with the usual lycaenine pattern of cellular, sub-basal (hindwing only), post-discal and submarginal spots.

* The genera with androconial scales present in the male are: *Tarucus* (probably *waterstradii*), *Niphanda* (*tessellata*), *Everes* (*lacturnus*), *Celastrina* (except *quadriplaga*, *melana*, *pollicobra*, *pupa* and *cassaea*), *Chitades*, *Euchrysops*, *Catopyrops*, *Jamides* (except *bochus*, *talin* and *caeruleus*, *alecto* and *similda*), *Nacaduba* and *Catopyrops*.

- 20 (21) Eyes very slightly to moderately hairy. Underside hindwing not strongly whitened between the post-discal and submarginal fasciae, and the post-discal spot in space 4 not remarkably long. *Calastria*
- 21 Eyes smooth. Underside hindwing strongly whitened between the post-discal and submarginal fasciae, and the post-discal spot in space 4 twice as long as the spots in spaces 3 or 5. *Chilades*
- 22 Forewing veins 11 and 12 anastomosed or touching (fig. 106).
- 23 (28) Eyes smooth or slightly hairy. Small size, and with the usual lycaenine pattern composed of small dark spots.
- 24 (27) Forewing veins 11 and 12 shortly anastomosed (or touching) and then free to the costa (fig. 106).
- 25 (26) Eyes slightly hairy. Underside hindwing post-discal spot in space 6 moved in and not in line with the spots in spaces 5 and 7. *Zizina*
- 26 Eyes smooth. Underside hindwing post-discal spots in spaces 5 to 7 in line. *Zizeeria*
- 27 Forewing veins 11 and 12 anastomosed to the costa (fig. 109). Underside hindwing post-discal spots in spaces 5 to 7 in line. Eyes smooth. *Zizula*
- 28 Eyes densely hairy. Larger than in *Zizina*, *Zizeeria* and *Zizula*.
- 29 (30) Forewing apex pointed. Hindwing tornal cilia elongate. Underside buff brown, with the usual lycaenine pattern consisting of separate dark brown spots, and the two blackish spots in space 7 on the hindwing larger and more prominent than any others; hindwing without black tornal spots. *Una*
- 30 Forewing apex blunt. Hindwing tornal cilia hardly more elongate than usual. Underside pattern comprising rather large spots (hardly darker than the ground), formed by the faint, whitish, transverse lines; hindwing with two small black equal tornal spots. *Petrelaea*
- 31 Hindwing tailed (except in certain *Nacaduba* species).
- 32 (33) Hindwing with the cilia prolonged to form three minute tails at veins 1b, 2 and 3 (fig. 112). Eyes densely hairy. Underside spots coalesced to form irregular bands which are hardly darker than the ground. *Anthea*
- 33 Hindwing with a short filamentous tail at vein 2 (except *Nacaduba gracilis*, *N. dubiosa* and *N. lutea*).
- 34 (39) Eyes smooth (slightly hairy in *Euchrysops cnejus*). Underside with the usual lycaenine pattern of spots.
- 35 (36) Forewing veins 11 and 12 anastomosed for part of their lengths (fig. 102). Underside hindwing with the black submarginal spots in spaces 2 and 3 orange-crowned and larger and blacker than other spots. *Everes*
- 36 Forewing veins 11 and 12 free (fig. 111). Underside hindwing submarginal spot in space 3 not remarkably large.
- 37 (38) Underside forewing with two black spots in space 12. Underside hindwing with two black spots in space 7, of which the distal one is distinctly larger than any other; the black tornal spots not orange-crowned. *Megisba*
- 38 Underside forewing without spots in space 12. Underside hindwing with two black spots in space 7, of which the distal one is not larger than the tornal spot in space 2; the black tornal spots orange-crowned. *Euchrysops*
- 39 Eyes densely hairy.
- 40 (45) Forewing veins 11 and 12 anastomosed or touching.
- 41 (42) Forewing veins 11 and 12 touching but not anastomosed (fig. 113). Underside hindwing with two small black spots in space 7. *Catoxypops*
- 42 Forewing veins 11 and 12 anastomosed for part of their lengths (fig. 116). Underside with pale narrow transverse lines or catenulate bands, and without black spots in space 7 on the hindwing.
- 43 (44) Underside both wings with a dark highly lunulate, submarginal line, white edged on both sides. Underside hindwing with the dark subequal tornal spots in spaces 1b and 2 orange-crowned, and with the orange areas inwardly defined by a narrow dark line. *Catoxypops*
- 44 Underside not so marked. Underside hindwing with a black tornal spot in space a (a minute black spot may be present in space 1b), and the orange border above it not inwardly defined by a dark line. *Nacaduba*
- 45 Forewing veins 11 and 12 free, or connected by a short spur (fig. 114). Underside with narrow, transverse, whitish lines.
- 46 (47) Forewing veins 11 and 12 free but connected by a short spur near the base (fig. 114). Legs black and white ringed. Palpi second segment underside white and smooth. Underside hindwing with a large black tornal spot in space 2, and a very small black spot in space 1b. *Jamides*
- 47 Forewing veins 11 and 12 free throughout their lengths. Legs unicolorous. Palpi second segment underside white with projecting black hairs. Underside hindwing with prominent, black, subequal, tornal spots in spaces 1b and 2. *Lampides*

- 48 Forewing vein 7 arising at or just beyond the end of the cell (fig. 119). Underside yellow or orange. Eyes smooth.
- 49 (50) Hindwing with a moderately long tail at vein 2 (fig. 119). Underside deep yellow, with red distal borders. *Heliophorus*
- 50 Hindwing tailless, but slightly toothed at the vein endings. Underside orange, with reddish-brown bands edged with metallic green stripes. *Hypochrysoys*

Genus *Spalgis* Moore

Superficially, *Spalgis* forms a link between the Miletinae and the Lycaeninae, although the male genitalia are undoubtedly lycaenine in pattern.

The butterflies are small, the wings dark brown above, and with a small whitish discal patch in the female. The pale buff brown underside has numerous darker striations, and there is a clearly defined white spot at the cell-end on the forewing.

The carnivorous larva feeds on the coccid *Dactylopius adonideum*, which is the "mealy bug" of Ceylon planters.

The single Oriental species, *S. epeus*, is distributed throughout the Region, and there are a few representatives of the genus in tropical Africa. In Malaya *S. epeus nubilus* Moore is confined to the plains and is rare.

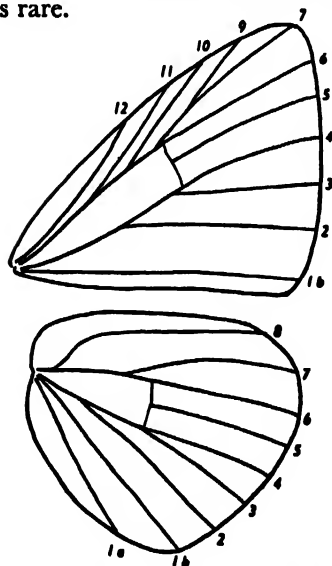


Fig. 98. *Spalgis epeus* ♂. Venation.

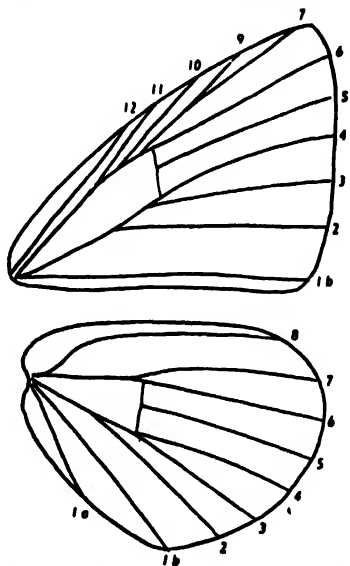


Fig. 99. *Taraka hamada* ♀. Venation.

Genus *Taraka* Doherty

The butterflies are weak and moth-like in flight; they are confined to heavy primary forest, and are very rare in Malaya.

The wings are brown above in *T. hamada mendesia* Fruhstorfer, and with a broad white discal patch on the forewing in the female. In *T.*

mahanetra mahanetra Doherty, the male is dark brown, while the female is white, with dark-brown bordering on both wings, and a cell-end stripe on the forewing. The former species is distributed from India to China, Japan and Malaysia, and the latter is known only from Malaya and Sumatra.

Key for the separation of the species of *TARAKA*

- 1 (2) Underside white with numerous black spots, including four along the costal margin of the forewing (genitalia, Plate 9, fig. 121). *T. hamada*
- 2 Underside white with rather obscure post-discal and submarginal fasciae, on which are superimposed a few small irregular blackish spots. *T. mahanetra*

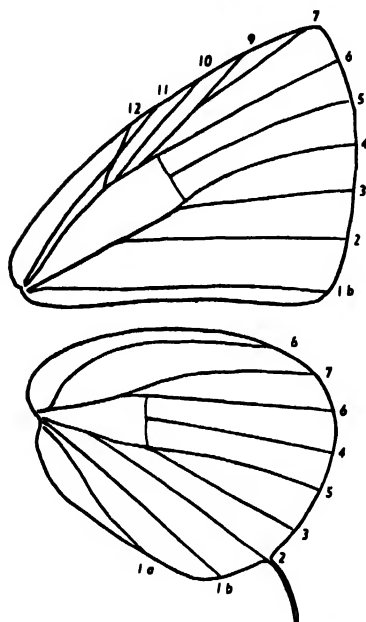


Fig. 100. *Castalius rosimon* ♂. Venation.

Genus *Castalius* Hübner

Wings predominantly white, with black markings on both surfaces, and with rather broad black bordering on the upperside. In some species the upperside is faintly shaded with blue or purple. The sexes are rather similar, the female having broader wings and, in some species slightly more extended dark markings. *Castalius roxus* differs from the other species of *Castalius* considered here in that vein 10 arises from vein 11 and not direct from the forewing cell.

The larvae feed on species of Rhamnaceae.

The genus is distributed from Ceylon and India through the Malay Archipelago to New Guinea and the Bismarck Archipelago; it is more widely represented in tropical Africa.

Key for the separation of the species of *CASTALIUS*

- 1 (2) Upperside white with black spots. *C. rosimon*
- 2 Upperside brownish black with a broad white discal band on both wings.
- 3 (4) Underside forewing basal markings comprise two parallel black strips. *C. ethion*
- 4 Underside forewing with a single black basal band.
- 5 (6) Underside forewing black basal band straight. *C. roxus*
- 6 Underside forewing black basal band angled. *C. elna*

Castalius roxus pothus Fruhstorfer

Plate 44, figure 155 ♂, 156 ♀

The Straight Pierrot

The wings above are predominantly black, with a broad white discal band extending from the end of the cell on the forewing to the dorsum on the hindwing. The underside is white, with a straight black sub-basal band from the middle of the costa on the forewing to near the base

of the dorsum on the hindwing, a series of black conjoined post-discal spots, and black marginal fasciae.

Like the other Malayan species of *Castalius*, *C. roxus* is quite common, and often found settled at moist spots on forest roads on the plains. Abroad, it ranges from Burma to Indo-China, the Philippines and Celebes.

C. elna elvira Fruhstorfer differs from *C. roxus* in that the sub-basal band on the underside is angled near the base of space 3 on the forewing. A darker race (subspecies *epesus* Corbet) occurs on Pulau Tioman. Distribution much as for *C. roxus*, but the species is present in India and absent from the Philippine Islands.

In *C. ethion thalimar* Fruhstorfer, each wing has two black sub-basal stripes on the underside, and, in the male, the black markings on the inner areas on the upperside are tinged with purple. The greenish white larva has a faint green dorsal band, and is thickly clothed with fine white hairs. *C. rosimon rosimon* (Fabricius) is white with black spots and bordering, and the basal areas are pale shining blue. The underside has numerous black spots and stripes, and the usual marginal fasciae. The larva is bright green with a double yellow dorsal line, and the sides powdered with small yellow spots. Both *C. ethion* and *C. rosimon* are found throughout the Oriental Region (Genitalia, Plate 9, figs. 122, 123); their larvae usually feed on *Zizyphus jujuba*, a plant not recorded in the Malay Peninsula.

Genus *Tarucus* Moore

The genus is represented from south Europe and north-west Africa through Ceylon and India as far east as Celebes, although representatives in the Oriental Region are rare outside of India. Both structurally and on wing pattern, the genus is closely allied to *Castalius*.

The only Malayan representative is *T. waterstradti vileja* Fruhstorfer, which is very rare, and as no specimens are available to us for examination, we can only assume it has the structural characters of the type species *T. theophrastus* (F.). The last-named species is characteristic of the drier regions of the Old World, where the larva feeds on *Zizyphus jujuba* and is attended by ants.

T. waterstradti has the wings above pale purplish blue in the male; in the female the wings are white with large discal spots and broad black bordering, and the wing bases dusted with pale-blue scales. The white underside is rather heavily marked with black stripes in the basal halves of the wings, and with black spots in the outer halves. *T. waterstradti* is known only from a few specimens from Malaya and Borneo, and it appears to be confined to lowland forest.

Genus *Niphanda* Moore

Structurally similar to *Anthene*, but without the three small tails on the hindwing and the forewing with vein 11 nearer to vein 12.

The wings above are dark purple blue in the male, while in the female the wing bases are blue and the discal areas are whitish with prominent black markings. The underside is grey or whitish, and the dark spots are arranged to form the usual lycaenine pattern. The forewing has a dark streak along the base of the costa, and a dark spot in the middle of the cell which increases in width to the dorsum; the post-discal spots in spaces 1b and 2 are moved inwards and are not in line with the rest of the series. The hindwing spots in spaces 6 and 7 are black and very prominent. The male of *N. tessellata*, and of two non-Malayan species, have curious androconial scales which are "hieroglyphically marked" (Evans, 1932).

The genus is represented from north China to India, Malaysia and the Philippines, and there has been much confusion of the species which, however, can be separated without difficulty on the basis of the male genitalia.

N. tessellata tessellata Moore, which can be readily distinguished from *N. cymbia cymbia* Nicéville by the large and prominent black submarginal spots in space 2 on both wings, is the least uncommon of the Malayan species, and, like *N. cymbia*, it is confined to lowland forest. *N. tessellata* is found from south Burma to Malaysia and the Philippines, while *N. cymbia* ranges from Sikkim to Neomalaya.

(Basic literature: Corbet, 1942d.)

Key for the separation of the species of NIPHANDA

- 1 (4) Underside white. Underside with the post-discal spots in spaces 4 to 9 on the forewing, and in spaces 6 and 7 on the hindwing, outwardly broadly and heavily shaded with dark brown.
- 2 (3) Underside forewing with a prominent black submarginal spot in space 2. Underside hindwing with the submarginal spot in space 2 large and black, and the submarginal spot in space 3 hardly more prominent than those in spaces 4 and 5. (Genitalia, Plate 9, fig. 125.) *N. tessellata*
- 3 Underside forewing with the submarginal spot in space 2 not blackened. Underside hindwing with the submarginal spots in spaces 2 and 3 black and subequal. (Genitalia, Plate 9, fig. 124.) *N. cymbia*
- 4 Underside pale greyish brown. Underside with the post-discal spots not outwardly shaded. (Genitalia, Plate 9, fig. 126.) *N. asialis*

Genus *Pithecops* Horsfield

The sole Malayan representative of this genus is remarkably like *Neopithecops zalmora*, but the two species are easily separated on account of the anastomosis of veins 11 and 12 on the forewing and the presence of two small black costal spots on the forewing beneath in *P. corvus*.

Pithecops corvus corvus Fruhstorfer

Plate 44, figure 157 ♂

The Forest Quaker

P. corvus is a small butterfly, with the wings brown and unmarked above; the underside is pure white, with a large black circular spot

on the costa of the hindwing, and pale reddish brown submarginal fasciae on both wings. The sexes are alike. Unlike *N. zalmora*, *P. corvus* has two black dots near the middle of the costal margin on the forewing beneath.

The butterfly has a feeble, fluttering, but rather erratic flight some two or three feet from the ground.

It appears silvery white on the wing. It occurs at all usual elevations in heavy forest and is rather local. The larva feeds on a species of Leguminosae, as well as on *Gardenia florida*.

P. corvus is distributed from Sikkim to Burma, and through the Archipelago to New Guinea, the Bismarcks, and the Solomon Islands. Formerly, this species was known as *P. hylax* (F.), but it has been shown (Corbet, 1940h) that the Fabrician name refers to the *Zizula* which formerly passed as *Z. gaika* (Trimen).

A second species in the genus is *P. fulgens* Doherty, in which the male is dark shining blue above, and the female brown. It is known from Assam, Sumatra and Borneo, and almost certainly will be found in the Peninsula. *P. fulgens* is without the black costal spots on the forewing beneath.

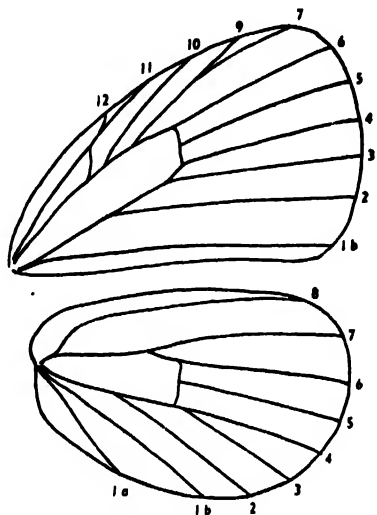


Fig. 101. *Pithecopus corvus* ♀. Venation.

Genus *Neopithecopus* Distant

Very closely related to *Pithecopus*, but the wings are broader. The male genitalia in the two genera are rather similar in pattern. The sole species of *Neopithecopus* differs from *P. corvus* as stated on page 276, and, moreover, the forewing above usually shows a whitish discal streak. *N. zalmora horsfieldi* Distant frequents the same situations as *P. corvus*, and has the same habits, although it is not found on the hills.

The larva has been described as light green, with sharply defined segments, and the yellowish head spotted with brown. The body is sparsely covered with short whitish hairs. The larva feeds on *Glycosmis pentaphylla*, and rests on the under surface of a leaf of the food plant.

N. zalmora ranges from Ceylon and India through the Archipelago as far east as the Bismarcks, but it appears to be absent from the mainland of Celebes and New Guinea.

Genus *Everes* Hübner

Medium-sized butterflies, with the wings beneath pale grey or whitish, and the grey or brown spots arranged in the usual lycaenine pattern.

The genus is represented in all four Regions.

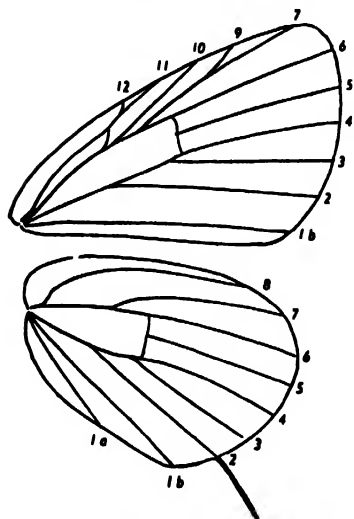


Fig. 102. *Everes lacturnus* ♂. Venation.

E. lacturnus rileyi Godfrey is distributed from Ceylon and India to China, and through the Malay Archipelago to Australia. It is rare south of Siam, however, and is of sporadic occurrence in rather open country on the lowlands in Malaya. The male is pale purple-blue, with narrow black borders, and the female is almost entirely dark brown, except for the black-spotted orange tornal patch on the hindwing. The underside is pale grey, with greyish-brown post-discal spots on both wings, and small black sub-basal spots on the hindwing; black sub-marginal spots in spaces 2 and 3 on the hindwing are proximally orange-crowned.

The larva has been described as green, with black dorsal and sub-dorsal lines, a light lateral line and dark spiracles. One of the food plants is *Trifolium*.

E. potanini glycon Corbet is dark brown above in both sexes, and the female has the black marginal spot in space 2 on the hindwing orange-crowned. The greyish-white underside is without markings in the basal half of each wing, and both wings have a broken ochreous fascia. *E. potanini* is most abundant in western China, but it occurs as far south as Kedawi, and Stubbs has taken it on limestone cliffs near Ipoh, in Perak.

Key for the separation of the species of *EVERES*

- 1 (2) Underside hindwing with two small separated black spots in space 7, and the orange tornal area not separated from the pale greyish ground by a narrow black line. (Genitalia, Plate 9, fig. 127.) *E. lacturnus*
- 2 Underside hindwing with a single large black spot in space 7, and the orange tornal area separated from the pale greyish ground by a narrow black line. (Genitalia, Plate 9, fig. 128.) *E. potanini*

Genus *Megisha* Moore

The genus comprises a single species, with a large number of races, which ranges from Ceylon and India through the Archipelago to New Guinea and the Bismarcks.

The forewing is rather pointed in the male, and both sexes are dark

brown above, with the discal area of the forewing paler, almost imperceptibly in the male but more strongly in the female. The underside is dull grey, with markings which recall *Celastrina puspa* but the forewing has a series of costal spots. These spots, together with the post-discal and marginal markings are pale rusty brown, but there are prominent black spots in the basal third and at the apex and tornus on the hindwing.

The larva has been described as worm-like, light green, and with the middle segments swollen; it feeds on a species of Sapindaceae.

M. malaya velina Fruhstorfer has much the same habits as *Celastrina puspa*, the males frequenting forest roads, while the females are considerably scarcer. The butterfly appears to be confined to the plains.

Genus *Lycaenopsis* C. and R. Felder

The genus is essentially Malaysian in distribution, and there are two further species in Borneo in addition to the widespread *L. haraldus*.

The adults are more robust and the male has more pointed wings than is usual among the species of *Celastrina*, with which *Lycaenopsis* was formerly associated. The male is without androconial scales in all species. ♂ genitalia, Plate 9, fig. 129.

L. haraldus (*haraldus*) Fabricius is a rather large and beautiful butterfly. The male is shining blue, with the forewing apex rather broadly bordered with black, and the costal and inner areas of the hindwing strongly whitened. The female is black with a broad white discal band extending from the cell-end on the forewing to the dorsum of the hindwing, and suggests a large specimen of *Castalius roxus* or *C. elna*. The underside is white and unmarked, except for the black marginal border which has a series of large rounded white spots, each bearing an almost cruciform black spot; internal to the black border is a series of narrow black dashes.

L. haraldus is rare in primary forest in Malaya, and is least uncommon on the plains.

Genus *Celastrina* Tutt

The type of the genus is *C. argiolus* (Linnaeus), the British "Holly Blue," which is found throughout the Palaearctic Region and in North Africa and North America. In Malaysia, the genus is essentially montane in habitat, only *C. cossaea*, *C. melaena*, *C. cyma* and the rather aberrant *C. puspa* occurring more abundantly on the plains. The males are fond of congregating at moist spots, but both sexes fly around shrubs and bushes above eye level in the manner of *C. argiolus* in Europe.

Usually, the male is blue above, with a rather narrow black border, while the female is white, pale blue, or purple, often with white discal areas, and broadly bordered with black. The underside is usually pale bluish white or grey, with the usual lycaenine markings indicated by narrow dark streaks. Identification of the species may be a matter of considerable difficulty, especially as regards the females, not all of which

are yet known. On the other hand, the male genitalia are specifically distinct, and individuals of this sex can be readily identified by examination of the valvae (Plates 9 & 10, figs. 130–142). As in the two preceding genera, the male genitalia are remarkable for the absence of the “dorsal hooks,” these organs being present only in *C. quadriplaga*.

In most species, battledore-shaped androconial scales are present in the male, but in *C. musina* the androconia are wedge-shaped and different from those of any other species in the genus.

In the Oriental Region the genus is represented from Ceylon and India through the Archipelago to New Guinea and the Bismarcks.

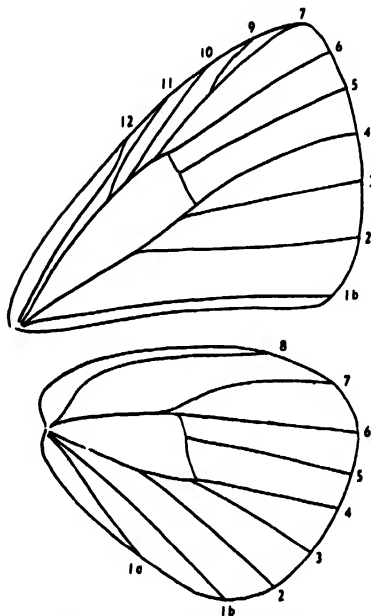


Fig. 103. *Celastrina dilectus* ♂. Venation.

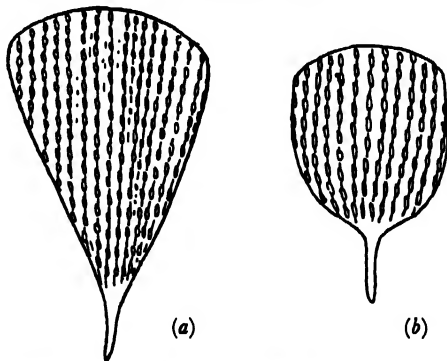


Fig. 104. Androconial scales in (a) *Celastrina musina* and (b) *Celastrina dilectus*.

(Basic literature: Toxopeus, 1927a, 1928, 1935c; Corbet, 1936, 1937e, 1938c, 1940d, 1940g; Evans 1953.)

Key for the separation of the species of CELASTRINA

- 1 (6) ♂ upperside deep purple or violet; hindwing with a comparatively broad black uniform border. ♀ upperside dark brown; forewing with an oblique whitish discal patch, dusted with blue. Underside bluish grey; hindwing with the post-discal spot in space 7 large and black, and more prominent than any other spot. (*melaena* group)
- 2 (3) Underside antennal club with the basal quarter strongly whitened. ♂ upperside deep shining violet blue; no androconia. ♀ upperside forewing with a narrow pale shining greenish-blue streak. *C. melaena* (11.0–12.0 mm.)
- 3 Underside antennal club entirely black (faintly whitened in *C. cyma* ♀).
- 4 (5) ♂ upperside lustrous bluish purple; no androconia; forewing apex very acute. ♀ upperside forewing with a large pale shining blue patch extending to the dorsum. *C. pellocobra* (10.0–13.0 mm.)
- 5 ♂ upperside brownish purple, and the purple colour on the hindwing almost confined to the cell; androconia present; forewing apex blunt. ♀ upperside forewing with a narrow pale shining blue streak. *C. cyma* (11.0–13.0 mm.)
- 6 ♂ upperside blue, purple-blue or white; hindwing without a broad black uniform border (except in *C. quadriplaga* and, possibly, in *C. pupa*, in which species the black submarginal spots are visible.) ♀ upperside hindwing with at least a broad whitish or blue discal area.

- 7 (12) Underside hindwing with two large circular black spots in space 7, the outer spot being the larger, and touching both veins 7 and 8. ♂ androconia present only in *C. carna*. (puspa group)
- 8 (9) Underside pure white. *C. cossaea* (14.0-15.0 mm.)
- 9 Underside grey with reddish-brown dusting.
- 10 (11) Underside forewing post-discal spots broad and coalesced. ♂ upperside with a whitish discal patch on each wing. *C. carna* (14.5-15.5 mm.)
- 11 Underside forewing post-discal spots not coalesced. ♂ upperside without whitish discal patches. *C. puspa* (12.0-15.0 mm.)
- 12 Underside hindwing with the spots in space 7 not remarkably large and prominent. ♂ androconia present (except in *C. quadriplaga*).
- 13 (26) Underside forewing post-discal streaks forming a regular curve and not arranged *en echelon*. Underside hindwing no dark submarginal line or, if present, rather faint and confined to the tornal half of the wing. (akasa group)
- 14 (23) Underside hindwing entirely without a dark submarginal line. Forewing less than 15 mm. ♀ upperside with at least the basal halves of the wings blue or blue-dusted.
- 15 (16) Upperside white, with the usual markings; the hindwing without black bordering, but with prominent submarginal spots in ♀. *C. akasa* (11.0-13.0 mm.)
- 16 Upperside forewing blue (lavender-blue in *C. camenae* ♀), with or without a white discal patch.
- 17 (20) ♂ upperside hindwing white or predominantly white; upperside forewing black border at least 2 mm. at the apex. ♀ upperside white, except for the blue dusting in the basal halves of the wings.
- 18 (19) ♂ upperside forewing entirely blue, except for the broad black border. ♀ unknown. *C. arustus* (15.0 mm.)
- 19 ♂ upperside forewing blue with a large white discal patch. ♀ upperside forewing with all margins rather broadly black bordered, that on the termen decreasing towards the base, and hindwing with veins slightly dark dusted and the termen with black diffuse submarginal spots. *C. albocaeruleus* (14.0-15.0 mm.)
- 20 ♂ upperside hindwing blue; upperside forewing black border less than 2 mm. at the apex. ♀ upperside blue or blue washed.
- 21 (22) Underside forewing post-discal spots forming an evenly curved arc. ♂ upperside bright lustrous blue, with the forewing black border increasing noticeably towards the apex. ♀ upperside bright blue with broad bordering. *C. ceyx* (12.0-13.0 mm.)
- 22 Underside forewing post-discal spots more or less parallel to the termen, and the costal spot in space 6 moved inwards out of line with the rest. ♂ upperside dull blue, with the forewing black border more uniform and increasing only slightly towards the apex. ♀ upperside white, washed with lavender-blue, and with broad bordering on the forewing. *C. camenae* (12.0-15.0 mm.)
- 23 Underside hindwing dark submarginal line present but not extending above vein 6. Forewing longer than 15 mm. ♀ upperside white, forewing with black bordering, and hindwing with black submarginal spots.
- 24 (25) ♂ upperside pale lavender-blue, with a large white discal patch on each wing, that on the hindwing extending to the costa, and with the veins dark dusted on the whitened areas; forewing black border narrow, and increasing towards the apex. ♀ upperside forewing black border not continued along the dorsum. *C. corythus* (16.0 mm.)
- 25 ♂ upperside shining purplish blue; forewing black border a thread. ♀ upperside forewing black border continued along the dorsum, and the wing bases pale shining lavender-blue. *C. coalita* (17.0 mm.)
- 26 Underside forewing post-discal streaks arranged *en echelon*. Underside hindwing with a dark submarginal line.
- 27 (34) Forewing longer than 13 mm. ♂ upperside blue; ♀ upperside blue, or white, dusted with blue. (singalensis group)
- 28 (31) Underside very pale bluish white, with the markings rather faint and not white edged. ♂ upperside forewing black border a thread.
- 29 (30) ♂ upperside violet-blue, and without pale discal patches. ♀ upperside blue with broad borders on the forewing. *C. singalensis* (14.0-15.0 mm.)
- 30 ♂ upperside pale blue, with pale discal patches which may be obsolete. ♀ upperside white, washed with lavender-blue, dark dusted, and with broad borders on the forewing. *C. dilectus* (13.0-15.0 mm.)
- 31 Underside grey, with reddish dusting, and the heavier markings edged with white. ♂ upperside forewing black border increasing towards the apex.
- 32 (33) ♂ upperside forewing black border increasing to nearly 2 mm. at the apex. ♀ upperside purple-blue, with the usual black bordering. *C. limbata* (12.5-14.0 mm.)

- 33 ♂ upperside forewing black border narrower and about 1 mm. at the apex. ♀ upperside white, faintly washed with lavender-blue, and with rather broader borders.
C. placidula (15·0-16·5 mm.)
- 34 Forewing less than 13 mm.
- 35 (36) Upperside blue. Underside hindwing with two black costal spots in space 7. ♂ androconia wedge-shaped. *C. musina* (10·5-13·0 mm.)
- 36 Upperside white, faintly blue dusted, and with broad black borders on both wings. Underside hindwing with the spots in space 7 not more prominent than those elsewhere. ♂ no androconia. *C. quadriplaga* (12·0-13·0 mm.)

Celastrina puspa lambi (Distant)

Plate 44, figure 158 ♂; Plate 45, figures 159 ♂, 160 ♀

The Common Hedge Blue

This butterfly is common along forest roads on the lowlands, and becomes increasingly rarer as the hills are ascended. Above, the male is shining blue, with a regular black border on each wing, that on the forewing increasing towards the apex but not continued along the costal margin, and that on the hindwing inwardly defined by the edges of the black submarginal spots. The female is pale shining greenish blue, broadly black bordered on the forewing, and the distal half of the hindwing is black dusted. The underside is grey, with some reddish brown dusting, and with the usual lycaenine spotting. The hindwing sub-basal and post-discal large black spots in space 7 are especially prominent, the outer one being the larger; there are black sub-basal spots, as well as a submarginal series of black spots, which become browner towards the apex and are separated from the rest of the wing by a narrow dark lunulate line.

C. puspa occurs throughout Malaya, and the race *volumnia* (Fruhstorfer), from Pulau Tioman, is smaller and duller. The larva has been found on *Schleichera oleosa*, *Hiptage benghalensis* and *Xylia dolabriformis*, although we have not heard of its having been bred in the Peninsula. It is only occasionally visited by ants.

C. puspa is distributed throughout the Oriental Region.

In the rarer *C. cossaea distanti* (Fruhstorfer), the upperside resembles *C. puspa*, but the underside is chalky white. A third species in the *puspa* group and with the same underside pattern is *C. carna splendens* (Butler), but it is easily differentiated by the broad and confluent reddish brown post-discal fascia on the forewing beneath, and, in the male, by the whitish discal areas on the upperside of both wings. *C. carna* is restricted to the hills in Malaya, and abroad it extends from India to Java and Sumatra; *C. cossaea* is practically confined to Malaysia.

Allied to the *C. puspa* section is a small group of *Celastrina* species characterised by *C. melaena cowani* Corbet. On the upperside, the male is deep lustrous purple, with comparatively broad uniform borders on both wings. The female is entirely dark brown above, except for an oblique whitish patch, with bluish green scaling, in the discal area of the forewing. The grey underside is marked much as in *C. puspa*. In

C. pellecebra pellecebra (Fruhstorfer) the forewing apex in the male is sharply pointed, while in *C. cyma* Toxopeus the forewing apex is blunter than in the others, and it is only in this species that androconial scales are present.

These three species are essentially Neomalayan, although *C. melaena* extends as far north as Assam. *C. melaena* and *C. cyma* prefer the plains to the hills and are occasionally found in small numbers locally in patches of well-lit forest. Both sexes of *C. pellecebra* were common in one spot on Bukit Kutu in April 1931.

***Celastrina dilectus briga* (Fruhstorfer)**

Plate 45, figure 161 ♂

The Pale Hedge Blue

In appearance and habits this butterfly resembles its English congener *C. argiolus* (Linnaeus), the Holly Blue, which flutters along the hedgerows some six to ten feet from the ground; occasionally, the males may be found drinking at moist spots on the ground. The species of the *singalensis* group of *Celastrina* are most strongly represented in the Himalayas; in Malaya, they are generally confined to the mountains, although individuals may stray to lower levels.

In these montane species of *Celastrina*, the underside is bluish white (or white in *C. akasa* and *C. quadriplaga*), with the usual lycaenine markings comprising small dark separated streaks. In *C. dilectus* and its allies, the forewing post-discal spots are obliquely set and arranged in an even arc, and the hindwing submarginal spots are separated by a narrow lunulate line. *C. dilectus* is the commonest representative of its group, and can be identified by the rather obscure white discal patches on the blue wings of the male, while the much rarer female has the forewing patch shining blue.

The male of *C. singalensis xanthippe* Corbet is without the pale discal areas, and the female has lustrous purple scaling on both wings. In *C. limbata isabella* Corbet and the larger *C. placidula irenae* Corbet, the underside is dingier and the post-discal spots are mostly outlined with whitish. *C. musina candaules* (Nicéville) is smaller than its allies, with a forewing length of 11 to 12 mm., and the dingy underside has the spotting fainter than usual. *C. musina* is widely distributed, and is often locally common.

C. camenae pendleburyi Corbet may be taken as the representative of the *akasa* group in which the post-discal spots on the forewing beneath are arranged in a regular arc and the hindwing is without a submarginal line. The male of *C. camenae* is rather dull blue above, while the female is washed with a beautiful lavender blue. In the rather smaller *C. ceyx tanarata* Corbet, the male is bright shining blue, with a broader black border to the forewing, and the female is a paler shining blue. *C. akasa*

catullus (Fruhstorfer) is white above and below, and has the forewing broadly black bordered in both sexes: occasionally, it appears in some numbers in open areas on the hills. *C. akasa* differs from the much rarer *C. quadriplaga archena* Corbet in lacking a broad uniform black border on the hindwing.

There are a few other Malayan species of *Celastrina* allied to *C. camenae* with the upperside blue in the male, and characterised by whitened areas on the upperside: all are rare. One of the most beautiful of Malayan butterflies is the male of *C. albocaeruleus scharffi* Corbet, in which the forewing is bright shining blue, with a large white discal patch, and a black distal border which increases markedly towards the apex; the hindwing is white with the basal area blue and the underside spotting visible by transparency.

Most of the Malayan species of *Celastrina* occur from India to Java.

Genus *Chilades* Moore

This genus is rather ill-defined, and is allied to *Polyommatus* Latreille. In addition to *C. lajus* one or two other Oriental species are included in the genus, which is also represented in tropical Africa.

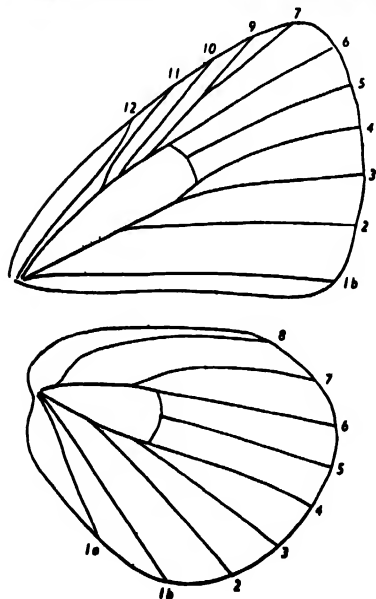


Fig. 105. *Chilades lajus* ♂. Venation.

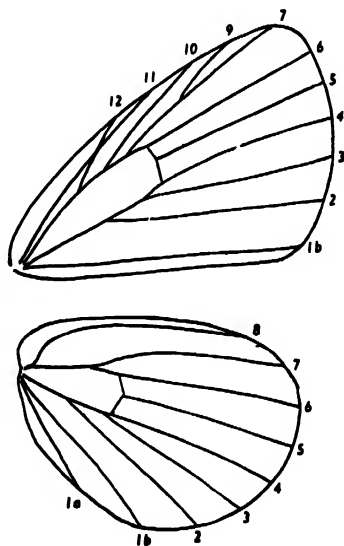


Fig. 106. *Zizina otis* ♂. Venation.

In the single Malayan species, *C. lajus tavoyana* Evans, the male is pale purplish blue above, with black marginal spots on the hindwing; the female is dark brown, with the wing bases broadly shining blue, and the

hindwing with a series of black marginal spots which are inwardly defined by narrow white lunules. The underside is grey, with the lycaenine spotting larger and blacker than usual and broadly outlined with white; the inner edge of the dark submarginal fascia is very broadly edged with white.

The larva is pale green, with a dark dorsal line, and is attended by ants.

In Malaya, *C. lajus* is confined to open country in Kedawi. Its distribution abroad is somewhat curious, the species being found from Ceylon and India to Burma, Formosa, Hong Kong, Hainan, Mangalum Island (north-west of British North Borneo) and the Philippines.

Genus *Zizina* Chapman

This and the two following genera are remarkable for the wide distribution of most of the species. The adults are small, the male purplish blue above, and the female dark brown; the underside is pale grey, with the usual lycaenine markings of small spots, and there is no orange scaling at the tornus on the hindwing.

The *Zizeeria* group is represented in all the continents.

The Malayan species of the *Zizeeria* group of genera can be separated by the following scheme.

		Underside hindwing post-discal spot in space 6.	Underside forewing spot in the cell.	Underside forewing spot in space 11 above the middle of cell.
<i>Zizina otis</i> ..	Moved inwards.		—	—
<i>Zizeeria knysna</i> ..	In line with the spots in spaces 5 and 7.		Present.	—
<i>Zizula hylax</i> ..	In line with the spots in spaces 5 and 7.		—	Present.

Zizina otis lampæ (Corbet)

Plate 10, figure 143, ♂ genitalia

The Lesser Grass Blue

This is almost the smallest Malayan butterfly, and is one of the commonest, occurring on grassy patches on the plains, and always flying within a few inches of the ground.

Above, the male is a dull purplish blue, with rather broad diffuse black borders, and the female is brown. The underside is pale grey with small dark spots arranged to form the usual post-discal and marginal series, a spot at each cell-end, and a series in the basal area of the hindwing. *Z. otis* differs from the closely allied *Zizeeria knysna* and *Zizula hylax* in the proximal position of the post-discal spot in space 6 on the hindwing.

The larva feeds on the Sensitive plant (*Mimosa pudica*) and on *Alysicarpus vaginalis*.

Z. otis is found almost throughout the Indo-Australian Region, ranging from Ceylon to Japan in the north, Samoa in the east, and Australia and New Zealand in the south. It is widely distributed on the African mainland, and occurs in Madagascar and Mauritius.

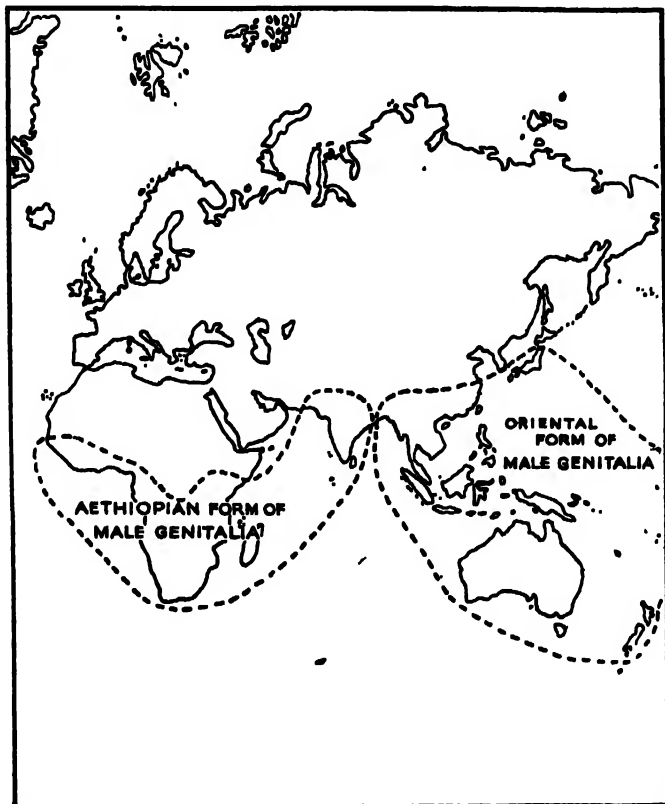


Fig. 107. Distribution of *Zizina otis*.

Zizina otis is widely distributed throughout the Aethiopian and Indo-Australian Regions. The male genitalia occur in two distinct forms, which are separated geographically, the boundary between the two being in the neighbourhood of Bengal. No other butterfly is known with this curious distribution of genitalic forms.

As in the case of the following species, the contour of the male valva is different in the Indo-Australian and Aethiopian Regions, but, curiously enough, the representatives of *Z. otis* in Ceylon and Peninsular India have the male genitalia as in the African forms, the dividing line between the two being in the neighbourhood of Bengal.

Genus *Zizeeria* Chapman

Structurally differs from the preceding genus only in the smooth instead of slightly hairy eyes.

Zizeeria knysna karsandra (Moore)

Plate 45, figure 163 ♀; genitalia, Plate 10, figure 144

The Dark Grass Blue

Although there are but three records of this species from the Malay

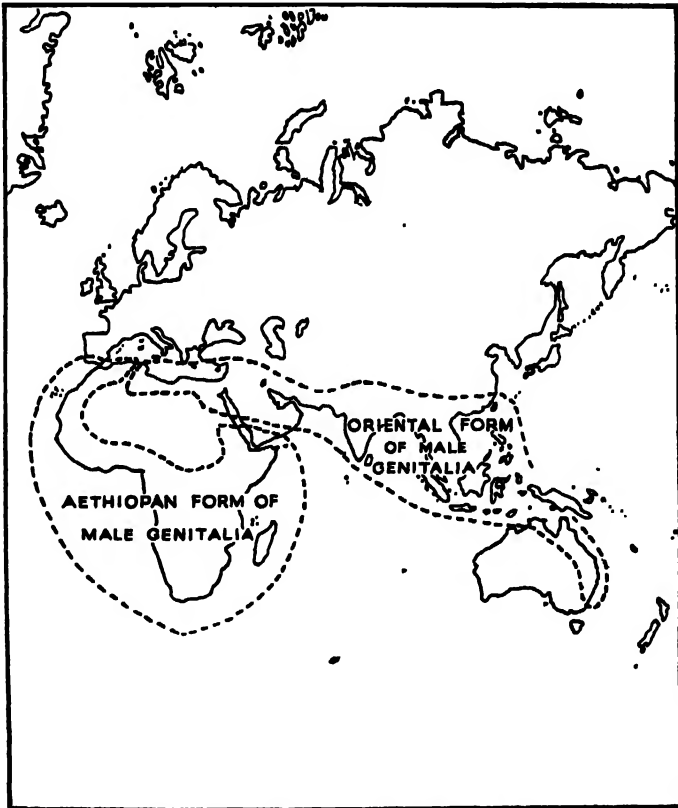


Fig. 108. Distribution of *Zizeeria knysna*.

In this species, which is widely distributed in the Ethiopian and Indo-Australian Regions, and even reaches Spain and Portugal, there are two types of valva in the male genitalia, and these show a clear-cut geographical separation. The boundaries between the two types are situated in Algeria and in Arabia. Superficially, adults with the different types of male genitalia cannot be separated.

Peninsula (Perlis, Penang and Trengganu), the insect is of sufficient interest to warrant further notice. Although it closely resembles *Zizina*

otis, it can be readily separated on the characters given on page 285. In spite of the close resemblance, however, it appears quite improbable that *Z. knysna* has occurred in any numbers in Malaya in recent years and escaped detection.*

It seems that *Z. knysna* prefers the drier parts of the equatorial regions, and this may explain some of the lacunae in its distribution. In the Oriental Region it occurs from Baluchistan and Ceylon to India and Burma, and it is only in these latter countries that the insect is common. It is rare in Formosa, Hainan, Malaya, Sumatra, North Borneo, the Philippines and the eastern parts of Australia; it is true that the species has been reported from other islands, such as Java and Nias, but we suspect these records to be erroneous.

The species occurs also throughout Africa, and even reaches Spain and Portugal, but the Aethiopian form has a different male valva, the distal edge being smoother and the ventral apex much more pointed than in the Oriental form. We have seen no specimens that can be regarded as intermediate between the two, and it is remarkable that the boundary between the two genitalic forms is not that between recognised zoo-geographical areas. In fact, the Oriental type of valva is found as far west as north-east Arabia, Syria, Cyprus, Egypt and eastern Algeria, while the true African type reaches southern Arabia, Socotra, the Sudan, the Seychelles, Mauritius and Madagascar.

There are one or two other species of *Rhopalocera* in which different races occur in northern and southern Arabia, but we know of no other organism with such a boundary line in Algeria.

The larva of *Z. knysna* is green, and densely clothed with short whitish tubercles from which arise rather long colourless hairs; the head is small, black and shining. The food plants include *Zornia diphylla* and *Amaranthus viridis*, and a species of ant associated with the larva in the Oriental Region is *Tapinoma melanocephalum*.

Genus *Zizula* Chapman

Very close to *Zizina* and *Zizeeria*, and, structurally, differs only as stated in the key on page 272. The single species in the genus was formerly known as *Z. gaika*

(Trimen), but it has been shown that the much older Fabrician name *Hesperia hylax* refers to this butterfly.

* See Appendix, p. 494.

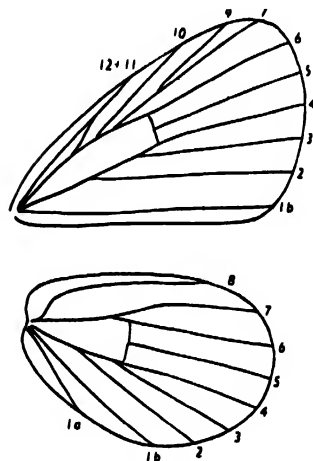


Fig. 109. *Zizula hylax* ♂.
Venation.

Z. hylax has the widest distribution of any Lycaenid, being found throughout the equatorial belt. In the Indo-Australian Region it occurs from Ceylon and southern India to Indo-China, and through the Malay Archipelago to the Moluccas, the Lesser Sunda Islands, Australia, the Solomon Islands and New Hebrides. In Africa it ranges from south Arabia and Abyssinia to the Cape, and it is found also in Madagascar and Mauritius. The American subspecies *tulliola* (Godman and Salvin), which is distributed from Mexico to Argentina, has a double spot in the cell on the forewing beneath in some localities.

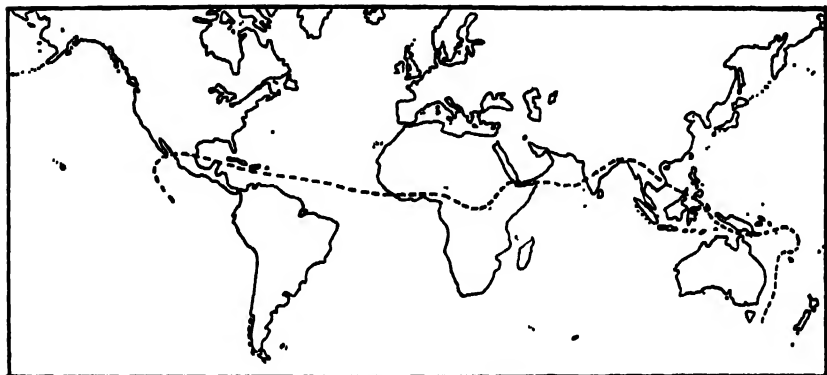


Fig. 110. Distribution of *Zizula hylax*.

Zizula hylax is the smallest butterfly found in Malaya. It is the only Lycaenid with a circumtropical distribution, and it is not found north of the dotted line—unlike *Zizina otis* and *Zizeeria knysna*, there is no difference in the male genitalia of *Zizula hylax* in the different regions.

Z. hylax pygmaea (Snellen), (Plate 45, figure 162 ♂; Plate 10, figure 145, genitalia) which is the smallest Malayan butterfly, is not uncommon in some coastal districts in Malaya, and on some of the islands. Where and when it occurs it may be common, but it is unusual to find it far from the seaboard in the Peninsula. The underside markings are more distinct and neater than in *Zizina otis*, and the butterfly has a more feeble and fluttering flight. It frequents open grassy patches on the forest edge or even in the vicinity of villages.

Genus *Euchrysops* Butler

Differs from the similar genus *Catochrysops* in the smooth or very slightly hairy eyes, in that veins 11 and 12 on the forewing are not contiguous, and in that the post-discal band on the forewing beneath is not broken at vein 3.

Some authors, notably Toxopeus (1929), place *E. pandava* in the genus *Chilades*. Although this course can be justified, we hesitate to adopt it without a thorough investigation of the Oriental genera of Lycaeninae.

Distributed from Ceylon and India through the Archipelago to the South Seas; represented also in tropical Africa.

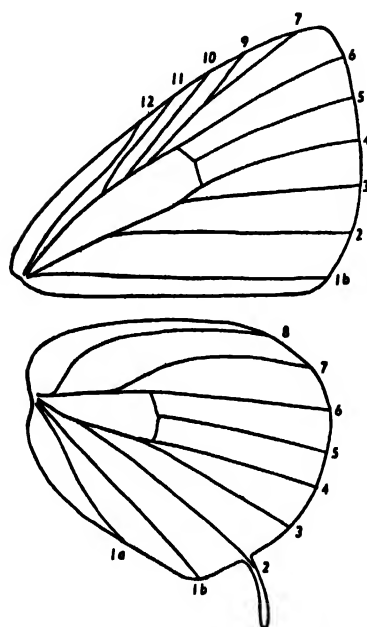


Fig. 111. *Euechrysops cnejus* ♂. Venation.

Key for the separation of the species of
EUECHRYSOPS

- 1 (a) Underside hindwing with the orange-crowned black spots in spaces 1b and 2 sub-equal. *E. cnejus*
- 2 Underside hindwing with the orange-crowned black spot in space 2 much larger than the orange-crowned spot in space 1b. *E. pandava*

Euechrysops cnejus cnejus (Fabricius)

Plate 45, figure 164, ♀; genitalia, Plate 10, figure 146

The Gram Blue

Above, the male is purple, slightly shining in some lights, and with the black tornal spots in spaces 1b and 2 narrowly orange-crowned. The female is rather heavily black-dusted, with the wing bases pale shining blue; the hindwing is outwardly whitened, with the dark submarginal spots inwardly bordered with a narrow, dark, sinuate line, and the orange-crowned spots in spaces 1b and 2 blacker and larger than the

rest. Underside pale buff, with the usual lycaenine markings as spots and striae, slightly darker than the ground, but defined by whitish bordering; the spots in the costal and basal areas of the hindwing are black and very distinct, and the black submarginal spots in spaces 1b and 2 are edged with metallic green scaling and inwardly crowned with orange.

The larva is pale green, with dark dorsal and sub-dorsal lines and the latter are coalesced into a broad band on the anal segments; the segments are covered with minute white tubercles, and the spiracles are black. The food plants include *Phaseolus radiatus* and *Vigna cylindrica*, and there is a symbiosis with the ant *Camponotus compressus* (F.).

The butterfly prefers open country and is to be found, sometimes commonly, flying low on grassy waste places. It is widely distributed on the plains in Malaya but is not usually abundant. Abroad, the species occurs from Aden to Baluchistan, Ceylon and India to south China, through the Malay Archipelago to Australia, and across the Pacific to the Low Archipelago.

E. pandava pandava (Horsfield) (genitalia, Plate 10, fig. 147) is a low-

land butterfly which is somewhat local in distribution. It is easily distinguished from *E. cnejus* by the broader wings and the more rounded forewing. The upperside is bluer in both sexes, and the marginal black spot in space 2 on the hindwing is appreciably larger than that in space 1b, and not subequal to it as in *E. cnejus*. The larva, which is variable in colour and markings, feeds on *Cycas revoluta*, and is attended by ants. The species ranges from Ceylon to Sikkim, Burma and Malaysia.

Genus *Anthene* Doubleday

In general appearance the adults resemble species of *Nacaduba*, but they are more robust, and the antennal club is longer and more gradual than in allied genera: the very short hindwing tails are scarcely noticeable in rather worn specimens.

The larvae feed on a variety of food plants.

The genus is represented from south-India through the Archipelago to New Guinea and the Solomon Islands; it reaches its greatest development, however, in tropical Africa, where there are many more species.

Key for the separation of the species of *ANTHENE*

- 1 (4) Underside hindwing with the spot near the base of space 7 large and coloured like the background.
- 2 (3) Underside forewing without a spot in the cell internal to the cell-end spot.
A. emolus
- 3 Underside forewing with a large spot (defined by narrow white lines) in the middle of the cell. *A. licates*
- 4 Underside hindwing with a small black spot near the base of space 7. *A. lycanoides*

Anthene emolus goberus (Fruhstorfer)

Plate 45, figure 165 ♂

The Ciliate Blue

The upper surface is deep purple-blue in the male, and dull brown with purple wing bases in the female. The latter sex has dark marginal spots in spaces 1b, 2 and 3 on the hindwing. The underside is a pale, rather earthy, brown with a series of catenulate bands defined by whitish stripes; on the hindwing near the margin in space 2 is an orange-crowned black spot.

A less common butterfly is *A. lycanoides miya* (Fruhstorfer); it is paler and more silvery above, and can be differentiated from *A. emolus* by the more tornally produced hindwing, and by the small blackish spot at the base of space 7 on the hindwing beneath.

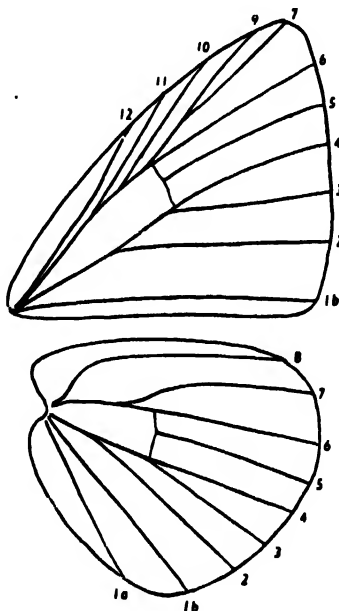


Fig. 112. *Anthene emolus* ♂. Venation.

A third but much rarer species is *A. licates dusuntua* Corbet, which is of the size of *A. lycaenoides*, but the underside has whiter markings, the interspaces are perceptibly darkened, and the black tornal spot in space 2 on the hindwing is more conspicuously orange-crowned.

The males of all three species are found at moist spots on forest roads, and both sexes frequent low-growing vegetation; *A. emolus* is the most widespread and occurs at all usual elevations in the Peninsula. *A. lycaenoides* and *A. licates* appear to be confined to the plains, and their females are much rarer than the males.

The slug-like larva of *A. emolus* is dark green, smooth, and shining, and with obscure reddish brown dorsal blotches on some segments; all the segments are irregularly and broadly pitted at the sides. The larva feeds on *Nephelium litchi*, *Cassia fistula* and *Heynea trijuga* and, doubtless, on other plants. Several individuals are found together, and they are attended by the ferocious red ant, *Oecophylla smaragdina*.

A. emolus occurs almost throughout the range of the genus in the Indo-Australian Region, and *A. lycaenoides* is found as far west as Ceylon.

Genus *Catochrysops* Boisduval

The adults are rather larger and more elegant than those of *Euchrysops*, and the black spotting on the hindwing beneath is confined to two black costal spots in space 7 and a single orange-crowned, black, tornal spot in space 2.

Distributed from Ceylon and India through the Malay Archipelago to Australia, New Caledonia and the Society Islands.

Key for the separation of the species of *CATOCHRYSOPS*

- 1 (2) Underside forewing with a spot on the costa between the spot at the end of the cell and the post-discal band. *C. strabo*
- 2 Underside forewing with the costal spot adjoining the upper end of the post-discal band. *C. panormus*

Catochrysops panormus exiguus (Distant)

Plate 45, figure 166 ♂

The Silver Forget-me-not

This species was formerly known as *C. lithargyria* Moore, but Felder's name *panormus* has priority.

The wings above are a pale clear blue in the male, with a single triangular black marginal spot in space 2 on the hindwing; the female

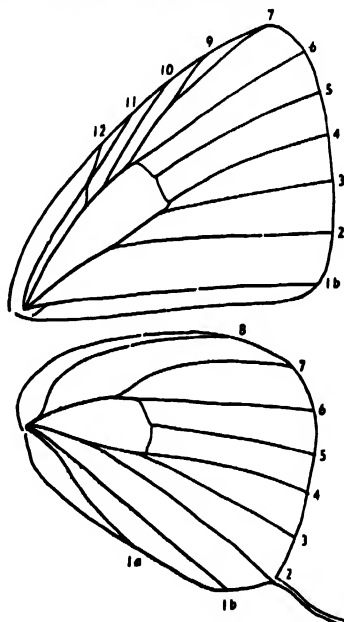


Fig. 113. *Catochrysops strabo* ♂. Venation.

is heavily black dusted, with the wing bases dull blue, and the hindwing with marginal spots, that in space 2 being large and inwardly orange-crowned. The underside is greyish white, with the white-edged post-discal spots coalesced to form a band which is broken at vein 3; the marginal spot in space 2 on the hindwing is large, black, triangular and broadly orange-crowned.

C. panormus may be found flying around rather low-growing flowering shrubs in waste places and in forest clearings on the plains in Malaya; it is not very common.

A similar species is *C. strabo strabo* (Fabricius), in which the male is lilac, and the paler female has more extensive pale blue, slightly shining areas on both wings. The underside is pale buff, with a costal spot (not evident in *C. panormus*), placed between the cell-end spot and the post-discal fascia on the forewing. *C. strabo* has the same habits as *C. panormus*, with which it was formerly confused. The larvae of the two species feed on such leguminous plants as *Phaseolus*, *Cajanus cajan* and *Dolichos*, and are associated with ants.

C. panormus is widely distributed, ranging from Ceylon and India through the Archipelago to Australia, New Caledonia and the Society Islands. *C. strabo* is also found in Ceylon and India but does not extend eastwards beyond the Moluccas.

Genus *Lampides* Hübner

This genus contains the single species, *L. boeticus*, which is distributed in southern Europe, almost throughout Africa and in the Indo-Australian Region as far east as Hawaii; it has not been found in America.

The underside pattern is unlike that of any other Lycaenine and comprises white transverse fasciae in the distal halves of the wings.

On the upperside, in the male, the wings are overlaid with hair-like scales which give them a frosted appearance. The male genitalia without the usual "dorsal hooks."

Lampides boeticus (Linnaeus)

Plate 45, figure 167 ♂; genitalia, Plate 10, figure 148

The Peablue

This is the English "Long-tailed Blue," which has been an infrequent visitor to the southern coast of England since it was first taken on the same day at Christchurch and Brighton in 1859. The larval habit of feeding on the newly formed pods of certain leguminous species of plants has earned for it the name of "pea-pod Argus." In the Malay Peninsula, *L. boeticus* is found almost wherever *Crotalaria anagyroides* is cultivated, and, as this plant has been employed as a "cover" on rubber plantations, the butterfly is widely distributed. The larva has other food plants, but *Crotalaria* appears to be the one most favoured in Malaya,

where the butterfly is common on the plains, although not uncommon on certain hill stations where *Crotalaria* is grown.

The male is dull purple above, with two black tornal spots on the hindwing; the female is brown, with the wing bases pale shining blue, and the hindwing with white post-discal and submarginal fasciae, and two black tornal spots as in the male. The underside is pale buff brown, with the wings traversed by white fasciae, and the black tornal spots in spaces 1b and 2 have metallic scaling and are orange-crowned. The hindwing tail at vein 2 is longer than in most species of *Lycaeninae*.

Usually, the larva is some shade of green, and is variable in markings. Roepke, who observed the species in Java, found that, although the *Crotalaria* shrubs were infested with a species of ant, the latter took no notice of any *L. boeticus* larva present.

There are very few records of the migration of this butterfly in the Oriental Region, and we know of none from Malaysia. Nevertheless, the entire absence of well-defined geographical races in *L. boeticus*, taken in conjunction with its extensive range, shows that it is nomadic.

Genus *Jamides* Hübner

Except for *J. bochus*, the type species of *Jamides* Hubner, all the species included here under this generic name were formerly

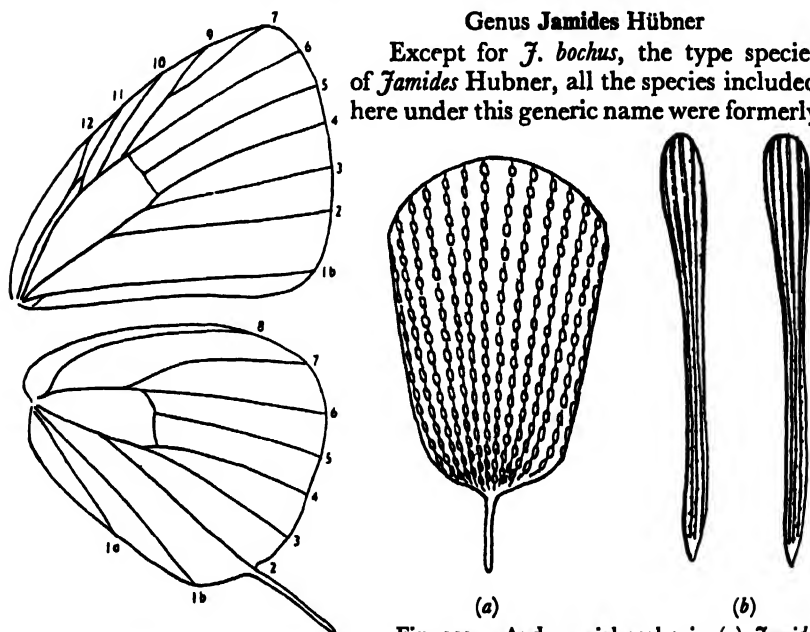


Fig. 114. *Jamides celeno* ♂. Venation.

Fig. 115. Androconial scales in (a) *Jamides celeno* and (b) *Jamides cyta*.

placed under *Lambides* Hübner, of which the type species has now been shown to be *L. boeticus*.

The wings are pale blue above, with a narrow black margin on the forewing in the male (brilliant metallic blue in *J. bochus* and coppery

green in *J. abdul*, with broad bordering in both species), and with a broader black apical border on the forewing and submarginal spots on the hindwing in the female. The underside is traversed by narrow white stripes, and the black tornal spot on the hindwing is crowned with bright orange.

Androconial scales are present in the males of all species except *J. bochus*, *J. talinga*, *J. caeruleus*, *J. alecto* and *J. cumilda*, and the male genitalia (Plate 10, fig. 149; 11, figs. 150-160) are specifically distinct. Identification of the very similar females may in the *elpis* group be a difficult matter. (For further data see appendix p. 494.)

The butterflies are found flying around shrubs and bushes along forest paths some three or four feet from the ground, and several of the species are common and widespread. The genus is distributed from Ceylon and India to Formosa, and through the Archipelago to Australia, the New Hebrides, Fiji and Tonga Islands.

(Basic literature : Riley and Corbet, 1938.)

Key for the separation of the species of JAMIDES

- 1 (2) Underside earthy brown, with the markings dull and indistinct. Upperside forewing black costal border extending into the cell. ♂ brilliant metallic blue.
J. bochus (12·0-15·0 mm.)
- 2 Underside grey or brownish grey, with prominent white markings. Upperside forewing black costal border not extending into the cell.
- 3 (26) Underside hindwing without a prominent submarginal series of dark wedge-shaped spots.
- 4 (13) Underside forewing with a short white line interposed between the two long basal lines.
J. celeno (13·0-16·0 mm.)
(*celeno* group)
- 5 (10) Underside hindwing with a single basal pair of straight white lines. Upperside pale chalky or whitish blue.
- 6 (7) ♂ upperside forewing black border increasing to at least 1 mm. at the apex. ♀ dull blue, forewing with a dull brownish black border, and the veins dark dusted in the distal half.
J. celeno (13·0-16·0 mm.)
- 7 ♂ upperside forewing black border a thread. ♀ brighter blue, forewing with a black border, and the veins dark dusted only on the edge of the black border.
- 8 (9) ♂ upperside unicolorous whitish blue. Forewing black border always a thread throughout. ♀ upperside forewing with underside markings visible by transparency.
J. pura (11·5-17·5 mm.)
- 9 ♂ upperside slightly brighter blue, deepening perceptibly towards the forewing apex and termen. Forewing border sometimes expands diffusely towards apex. ♀ upperside forewing with underside markings hardly visible.
J. zebra (15·0-17·5 mm.)
- 10 Underside hindwing with two basal pairs of straight white lines. Upperside sky-blue.
- 11 (12) ♂ upperside pale shining blue, with black submarginal spots in the tornal half of hindwing, and the underside markings hardly visible. ♀ upperside rather dingy, with the forewing black border incurved at the tornus, and the veins slightly dark dusted in the distal third.
J. malaccanus (13·5-16·5 mm.)
- 12 ♂ upperside paler blue, no submarginal markings on the hindwing, and with the underside markings visible. ♀ upperside paler and clearer blue, and with the forewing black border not turned in at the tornus. *J. parasaturatus* (14·5-17·0 mm.)
- 13 Underside forewing with two long, basal, white lines followed by two short white lines.
(*elpis* group)
- 14 (25) ♂ upperside some shade of blue. ♀ upperside without dusky bordering extending almost to the hindwing cell.
- 15 (16) Forewing less than 15 mm. ♂ upperside shining pale blue, with a comparatively broad black forewing border decreasing from 2 mm. at the apex to 1 mm. at the tornus. Underside of forewing usually with white costal dashes above the basal pair of lines.
J. talinga (11·0-14·5 mm.)
- 16 Usually larger. ♂ upperside forewing black border narrower. Underside of forewing never with costal dashes (except *cumilda*).
- 17 (18) ♂ upperside pale shining sky-blue, forewing black border a thread. ♀ upperside slightly shining pale blue with a prominent tornal black spot in space 2 of the hindwing.
J. elpis (12·0-17·5 mm.)

- 18 ♂ upperside forewing with the black border usually rather diffuse and increasing to about 1 mm. at the apex. ♀ upperside hindwing tornal black spot not much more prominent than the other submarginal spots (except in *alecto*).
- 19 (20) ♂ upperside metallic caerulean blue. ♀ upperside shining blue of deeper shade than other species in the group. *J. caeruleus* (14·0-17·0 mm.)
- 20 Upperside not as above.
- 21 (22) ♂ upperside purple-black with forewing border threadlike or rather diffuse and expanding to costa. ♀ upperside pale blue, the forewing black border rather more diffuse than usual, and the hindwing submarginal spots rather faint. *J. cunilda* (12·5-18·0 mm.)
- 22 ♂ upperside pale blue without a purple tinge. ♀ upperside pale blue with well-defined submarginal spots on the hindwing.
- 23 (24) Underside white markings broad and rather diffuse. ♂ without androconia. ♀ upperside black forewing border extends along costa to base. *J. alecto* (16·0-20·5 mm.)
- 24 Underside white markings narrower and more sharply defined; interspaces slightly darkened. ♂ with androconia. ♀ black border not beyond mid-costa, as usual. *J. ferrari* (16·0-17·5 mm.)
- 25 ♂ upperside coppery green, with broad black borders. ♀ upperside pale purple-blue, with broad dusky borders on both wings. *J. abdul* (14·0-19·0 mm.)
- 26 Underside hindwing with a prominent submarginal series of dark, wedged-shaped spots.
- 27 (30) Underside white markings as usual, the cell-end stripes on the forewing not forming a Y with the post-discal band.
- 28 (29) Upperside bright sky-blue. ♂ upperside forewing black border a thread and the hindwing without submarginal spots. ♂ androconia rather narrow and sparse. *J. philatus* (14·5-17·0 mm.)
- 29 Upperside pale chalky blue. ♂ upperside forewing black border uniform, inwardly diffuse, and nearly 1 mm. wide; hindwing with a double series of black submarginal spots. ♂ androconia broad and numerous. *J. aratus* (16·5 mm.)
- 30 Underside forewing with the cell-end stripes meeting the post-discal band to form a prominent Y. Upperside bright sky-blue. ♂ androconia very long and thickened at one end (fig. 115b). *J. cyta* (17·0-18·5 mm.)

Jamides celeno aelianus (Fabricius)

Plate 45, figures 168 and 169 ♂, 170 ♀

The Common Caerulean

Although members of the genus *Jamides* can generally be recognised immediately by the pale chalky or sky blue upperside (with a broad black border on the forewing in the female), and the grey underside traversed by narrow white lines, the identification of the species is not always easy. Indeed, in the existing state of knowledge it may be impossible to determine individual females with certainty.

J. celeno is the most widely distributed Malayan species, occurring at all elevations below about 4000 feet; it is also one of the most abundant, being found in gardens, in secondary growth, and in open forest flying around shrubs a few feet from the ground.

The larva is dull reddish green, thickly covered with minute white tubercles, and scarcely, if at all, hairy. It is attended by the ant *Camponotus variegatus*, and feeds on *Heynea trijuga*. *J. celeno* is distributed from Ceylon and India to Formosa and south China, and through the Archipelago to New Guinea and the Bismarcks.

In the species of the *celeno* group the white stripe just beyond the cell-end on the forewing beneath is short and not continued below the cell. *J. celeno* and *J. pura* are distinctive in that there is only a single basal pair of straight white lines on the hindwing beneath; these two species can be separated by the comparatively broad black border (which

increases to at least 1 mm. at the apex) on the forewing above in the male, and the paler and dingier female upperside, in *J. celeno*. Like most *Jamides* *J. pura pura* (Moore) is confined to forest, and is more abundant at lower elevations. Both *J. malaccanus malaccanus* (Röber) and *J. parasaturatus paramalaccanus* Riley and Corbet have two basal pairs of straight white stripes on the hindwing. The male of this latter species is pale blue, with the underside markings visible above, while the *J. malaccanus* male is deeper blue, and has black submarginal spots in the tornal area of the hindwing. The females are sometimes difficult to separate.

In the *elpis* group, the white stripe just beyond the cell-end on the forewing beneath, and the stripe basad from it, are continued obliquely to the dorsum. In the widely distributed and common *J. caeruleus caeruleus* (H. Druce), the male above is bright, shining, pale morpho blue, with a forewing black border which increases to about 1 mm. at the apex; the female is a deeper blue than any other species in the group. The male of *J. cunilda nisanca* (Fruhstorfer) is purple-blue, sometimes with a diffuse black border on the forewing, while the female is pale blue, with rather diffuse borders. In *J. elpis pseudelpis* (Butler) the male is pale shining sky-blue, with the hindwing paler, and the underside markings visible from above; the pale blue female has a more prominent black tornal spot on the hindwing upper surface than *cunilda*. The largest species of the *elpis* group is *J. alecto ageladas* (Fruhstorfer), in which the underside markings are slightly broader and more diffuse than in other species. The male of *J. alecto* has a black, diffuse border on the forewing expanding to about 1 mm. at the apex and a series of black submarginal spots on the hindwing; in the female the forewing border extends along the costa to the base. The aberrant male of *J. abdul abdul* (Distant) has the upperside a coppery green, with very broad diffuse black borders, and the blue female has the distal halves of both wings dark dusted. The smallest Malayan species is *J. talinga* (Kheil), in which the male has a comparatively broad black border on the forewing and submarginal spotting on the hindwing; indeed, at first sight, it may be mistaken for a female specimen, but the forewing black border is sharply defined in the apical area.

The rather uncommon *J. philatus subditus* (Moore) is easily recognised by the prominent black wedge-shaped submarginal spots on the underside of the hindwing. One of the largest Malayan species of *Jamides* is the montane *J. cyta minna* Riley and Corbet, which has the usual upperside pale blue colouring, but the underside is distinctive in that, on the forewing, the post-discal striae and the two cell-end stripes meet the stripes in spaces 1b and 2 to form a prominent Y. *J. cyta*, which was formerly known as *J. amphissa* (C. and R. Felder), is distributed from Malaya to the Solomon Islands, but it has not yet been found in the Philippines, New Guinea or Australia.

J. bochus nabonassar (Fruhstorfer) differs in both sexes from all other

members of the genus in that the broad black bordering on the forewing enters the upper portion of the cell. The underside is ochreous brown, with the comma-like markings narrow, dull and rather indistinct; the male is a brilliant, dark, morpho blue above. The butterfly has a most extensive range, occurring from Ceylon and India as far east as the New Hebrides and Fiji Islands. It may be taken fluttering around such flowers as *Crotalaria* and *Lantana*, and prefers open country in the lowlands.

Genus *Una* Nicéville

The genus is monotypic, containing a single species which is distributed from Assam to Burma and Malaysia. The life history is unknown.

Una usta usta (Distant)

Plate 45, figure 171 ♂

The Singleton

The male is a deep brownish purple above, while the female is pale purplish blue, with broad brown borders. The underside is pale buff brown, with small, brownish, cell-end, post-discal and submarginal spots on both wings, and larger and more prominent black spots in the costal and basal areas on the hindwing. The butterfly is without a tail, but the tornal cilia on the hindwing are elongate.

The insect is nowhere common in Malaya, although the male is taken occasionally in small numbers on forest roads at the usual elevations. The female is very rare, and we have seen no examples of this sex from Malaya. On the other hand, Moulton reported the species from Borneo as "Very common on the banks of the upper-waters of the Limbang and Madihit rivers, where hundreds could have been taken when settled close together on certain wet patches of sand or rock in company with *Lycaenopsis dilecta* [i.e. *Celastrina dilectus*]."

Genus *Nacaduba* Moore

The upperside is darker than in *Jamides* in both sexes, usually the male is some shade of purple or purple-blue, and the female is heavily dark dusted. The underside is darker brown than in *Jamides*, and the markings comprise pairs of short dull white striae arranged to form the usual Lycaenine pattern.

Androconial scales, with 12 to 20 ribs, are present in the male, and the male genitalia are of considerable diagnostic value, except in the smaller species comprising the *nora* group (and for which the generic name *Prosotas* H. H. Druce has been proposed) where the male organs are very similar. The male of *N. helicon* is distinctive, however, in the very produced wings and the almond-shaped, 6-8 ribbed androconia, and this species was separated in a new genus *Ionolyce* Toxopeus. The ♂ genitalia of most of the species are figured on Plates 11 and 12, figs. 161-174.

The butterflies are low-flying, the males often frequent moist spots on forest roads in some numbers, and several species are very common. In general, they prefer the lowlands to the hills.

Distributed from Ceylon and India throughout the Archipelago to Australia, and as far east as Samoa.

(Basic literature: Toxopeus, 1927*b*, 1929 ; Corbet, 1938*b*.)

Key for the separation of the species of
NACADUBA*

- 1 (12) Underside forewing without a pair of pale sub-basal lines in the cell. Hindwing tailed. (*pavana* group)
- 2 (3) Underside hindwing with a prominent rounded black submarginal spot in space 6. *N. angusta* (14.0–15.5 mm.)
- 3 Underside hindwing without a black apical spot.
- 4 (11) Underside both wings without a black submarginal line.
- 5 (6) Underside markings very broad, diffuse and yellowish. *N. pactolus* (14.5–16.0 mm.)
- 6 Underside markings narrow and white or whitish as usual, consisting of separate lunules, narrow and distinct in ♂, and may be broader in ♀.

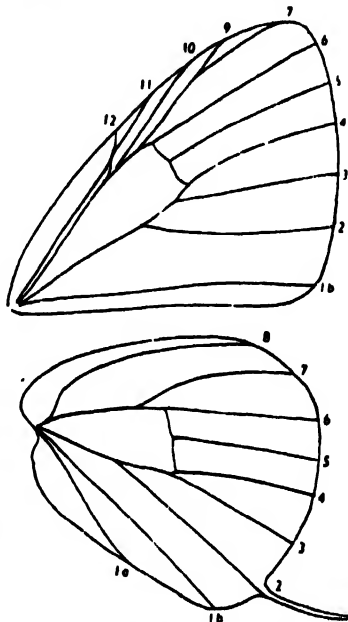


Fig. 116. *Nacaduba lysa* ♂. Venation.

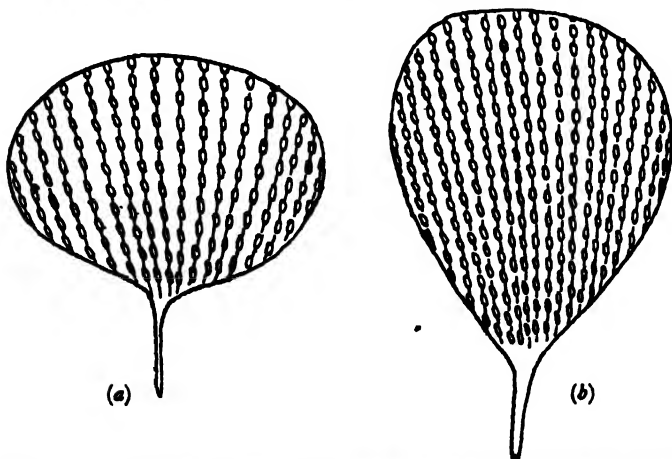


Fig. 117. Androconial scales in (a) *Nacaduba lysa* and (b) *Nacaduba pavana*.

- 7 (10) ♂ upperside forewing black border a thread. ♀ upperside forewing black border increasing markedly at the apex.

* See Appendix, p. 495.

- 8 (9) Underside hindwing white stripes in spaces 4 and 5 straight and conjoined. ♂ upperside rather greyish blue, with a slight frosted aspect. ♀ upperside forewing and basal area of the hindwing lustrous purple, with the forewing black border increasing towards the tornus. *N. hermus* (13.0-15.0 mm.)
- 9 Underside hindwing white stripes in spaces 4 and 5 comma-like and not in line. ♂ upperside deep purple. ♀ upperside both wings pale silvery blue, slightly dark dusted, and, usually, with the forewing black border increasing only slightly towards the tornus. *N. lysa* (12.0-13.5 mm.)
- 10 ♂ upperside forewing bluish purple, with the black border increasing appreciably towards the apex (about 1.0-1.5 mm.). ♀ upperside iridescent bluish purple, the costal and distal black borders on the forewing uniformly narrow (about 2 mm.). *N. asaga* (15.0 mm.)
- 11 Underside both wings with a prominent black, or very dark brown, submarginal line. ♂ upperside pale greyish blue, with a slight frosted appearance. *N. pavana* (11.0-12.0 mm.)
- 12 Underside forewing with a pair of pale sub-basal lines across the cell. Hindwing tailed (except in 3 small species).
- 13 (24) Underside with the spaces between the pale striae not appreciably darkened in ♂, and only slightly so in ♀ (the interspaces may be slightly darkened in individuals of *N. aluta*). Hindwing tailed. (*berenice* group)
- 14 (23) Underside markings pale yellowish, and the spaces between the striae not broader than usual.
- 15 (22) Wings not produced and termens rounded as usual. ♂ upperside not deep purple. ♀ upperside forewing with the lower area of the cell blue or purple.
- 16 (17) ♂ underside markings visible from above. ♀ upperside both wings pale shining blue, slightly dark dusted, and with a white discal area on the forewing. *N. kurava* (13.5-15.0 mm.)
- 17 ♂ underside markings not visible from above. ♀ upperside forewing black or dark brown, with a blue or purple, oblique patch, the discal area not prominently whitened, and the blue or purple dusting on the hindwing confined to the basal area.
- 18 (19) ♂ underside wing bases darkened. ♀ upperside forewing with a lustrous purple patch. *N. beroe* (12.0-14.0 mm.)
- 19 ♂ underside wing bases not darkened. ♀ upperside forewing not as above.
- 20 (21) ♂ upperside rather pale frosted lavender blue, the forewing black border a thread, and increasing very slightly towards the apex. ♀ upperside forewing with an obscure, pale, purplish blue patch, the discal area slightly whitened, and the basal half of the hindwing blue dusted. *N. berenice* (11.0-13.0 mm.)
- 21 ♂ upperside bluish purple, with the forewing black border almost imperceptible. ♀ upperside forewing with a lustrous blue patch with a faint greenish tinge. *N. calauria* (11.0-13.0 mm.)
- 22 Forewing apex and hindwing tornus produced, especially in ♂. ♂ upperside deep purple. ♀ upperside forewing cell entirely black. *N. helicon* (11.0-12.0 mm.)
- 23 Underside markings white, with the spaces between the striae broader than usual. *N. aluta* (10.0-12.0 mm.)
- 24 Underside with the spaces between the pale striae appreciably darkened (only slightly so in individuals of *N. dubiosa*). Hindwing tailed or tailless. (*nora* group)
- 25 (30) Hindwing tailed.
- 26 (29) Underside forewing with a spot in space 1b below the central cell spot.
- 27 (28) Underside forewing greyish white, whiter in the discal areas, post-discal band macular, and the spots in spaces 1b and 2 separate. *N. nelides* (13.5-14.0 mm.)
- 28 Underside forewing greyish buff, post-discal band confluent, and the spots in spaces 1b and 2 conjoined. *N. nora* (8.5-10.5 mm.)
- 29 Underside forewing no spot in space 1b below the central cell spot. Underside earthy brown in ♂, wing bases darkened in ♀. *N. bhutea* (11.5-12.5 mm.)
- 30 Hindwing tailless.
- 31 (32) Underside deep ochreous brown, with the wing bases broadly blackened. *N. gracilis* (11.0-13.0 mm.)
- 32 Underside not as above.
- 33 (34) Underside pale ochreous buff; hindwing with a prominent and rather large, blackish, subapical spot in space 6, and two minute, subequal, black, tornal spots at the end of vein 1b. *N. lutea* (9.0-11.0 mm.)
- 34 Underside greyish as usual; hindwing without a prominent, dark, subapical spot in space 6, and with a single small, black, tornal spot at the end of vein 1b. *N. dubiosa* (9.5-11.0 mm.)

Nacaduba berenice icena Fruhstorfer*Plate 45, figure 173 ♂***The Rounded 6-line Blue**

The upperside is pale lavender blue in the male, and the female is dark brown, with a pale purplish blue area on the forewing, the basal area of the hindwing dusted with the same colour, and this latter wing with a series of black, or blackish, submarginal spots. The buff grey underside has pairs of whitish striae arranged according to the usual lycaenine pattern, and there are marginal markings of the same colour ; in space 2 on the hindwing is a black marginal spot which is dusted with a few metallic green scales and has a pale orange halo. As in all species of the *berenice* group, the forewing cell has a basal pair of stripes which are absent in the *pavana* group.

N. berenice is common in the forested lowlands in Malaya, and the males are often found congregated at moist roadside spots. Abroad, *N. berenice* ranges from Ceylon and S. India to Australia.

A species similar in size and appearance to *N. berenice* is *N. calauria malayica* Corbet, but the male is a deeper purple-blue, and the female has a clear, lustrous blue, oblique patch on the forewing. Two larger species in the *berenice* group are *N. kurava nemana* Fruhstorfer and *N. beroe neon* Fruhstorfer. In the male of the former species the underside markings are faintly visible from above, and, in this sex of *N. beroe*, the wing bases are darkened on the underside. The female of *N. kurava* is pale shining blue above, with a whitish discal patch on the forewing, and a rather prominent series of dark submarginal spots on the hindwing, while that sex of *N. beroe* has a lustrous purple area on the forewing. The three species just dealt with are widely distributed in Malaya and frequent the hills as well as the plains.

The species of the *pavana* group* (the "4-line Blues"), without a basal pair of lines in the cell of the forewing beneath, are scarcer, and the commonest representative of the group is *N. lysa intricata* Corbet (Plate 45, figure 172 ♂). The female of *N. lysa* is much more abundant than the male, and has an upperside resembling that of *N. kurava*. In *N. pactolus odon* Fruhstorfer, which is another widespread species, the underside stripes are broader and more diffuse than in any other species except the much rarer *N. angusta kerriana* Distant, which can be recognised by the black submarginal spotting on the hindwing beneath, and the particularly large black submarginal spots in spaces 2 and 6.

Nacaduba helicon merguana Moore*Plate 45, figure 174 ♀***The Pointed Line-blue**

This widespread species was formerly known as *N. viola* (Moore).

Above, the male is deep purple and unmarked ; the female is a dingy

* See Appendix, p. 495.

brown with the discal area of the forewing and both basal areas lightly overlaid with bluish purple, and the hindwing has a marginal series of black or dark brown spots which are inwardly defined by a narrow whitish lunulate line. The underside is dull brown, with the narrow whitish transverse striae arranged much as in *Nacaduba berenice* and its allies.

The species is widely distributed in Malaya, and is commoner on the lowlands than in the hills. Its habits resemble those of the other *Nacaduba* species ; the males are often taken in numbers at moist spots on forest roads, but the females are uncommon. Abroad, the species ranges from Ceylon to Sikkim, the Moluccas and Australia.

***Nacaduba nora superdates* Fruhstorfer**

Plate 45, figure 175 ♂

The Common Lineblue

This is one of the smallest members of the genus (forewing about 10 mm.), and certainly the most abundant. In the male, the upperside is bluish purple, with an almost imperceptible black border on the forewing ; in the dark brown female the forewing has a somewhat obscure blue basal area, and the hindwing a series of dark submarginal spots. The underside is greyish buff, with a slight ochreous hue, and the wings are crossed by slightly darker brown fasciae margined with whitish ; the basal band in the forewing cell is continued to vein 1b. The hindwing is tailed at vein 2.

The butterfly is found in secondary growth and forest clearings, and males are taken congregated at moist spots on forest roads. The species occurs at all usual elevations throughout Malaya, but is commoner in the lowlands. Abroad, it ranges from Ceylon and India through the Malay Archipelago to Australia, and at least as far east as New Guinea.

A more widely distributed species, which extends across the Pacific Ocean to the Fiji Islands, is *N. dubiosa*, which was known in de Nicéville's day as the "tailless form of *N. ardates*" [that is, of *N. nora*]. *N. dubiosa lumpura* Corbet resembles *N. nora* above, and the underside is similar, except that there is no ochreous dusting, and the spaces between the striae are only slightly darkened. The butterfly is common in primary and secondary growth on the lowlands of Malaya ; very large numbers of males were seen flying among the grass of the roadsides on the outskirts of Kuala Lumpur on 6th March, 1930.

N. gracilis ni Nicéville is larger than *N. nora* and can be differentiated from all other members of the *nora* group in that the wing bases on the deep ochreous brown underside are conspicuously darkened. *N. gracilis* is a Malaysian species of which single specimens are taken in lowland forest. *N. bhutea* Nicéville, which is confined to the hills in Malaya, is of the same size as the last species, and has a more dingy underside,

but it can be readily separated by the presence of a hindwing tail which is absent in *N. gracilis*. *N. nelides* Nicéville is another montane species which is often locally common on some of the hill stations. In general appearance it resembles *N. bhutea*, but the ground colour beneath is pale greyish white.

A species somewhat intermediate in size and appearance between the *berenice* and *nora* groups is *N. aluta nanda* Nicéville, which is confined to the forested plains, and is usually taken singly. The underside markings are arranged much as in *N. berenice*, but the clear white striae are wider apart than usual. The male above is pale purple, and the blackish brown female has a lustrous, slightly greenish, blue oblique patch on the forewing. In some subspecies of *N. aluta*, the spaces between the lines on the underside are darkened, but such is not the case in Malaya. The male genitalia show that, structurally, *N. aluta* pertains to the *nora* group of species.

Genus *Catopyrops* Toxopeus

The grounds for the separation of this genus from *Nacaduba* are not considerable, although the male androconia are more rectangular and 14-ribbed.

The single Malayan representative *C. ancyræ aberrans* (Elwes), which is rare in lowland forest, differs from the *Nacaduba* species in the whitened outer areas on the underside, in which the usual markings are present as pale buff confluent bands; the dark interneural submarginal spots on the hindwing are separated from the rest of the wing by a narrow lunulate line, and the orange areas crowning the large dark subequal spots in spaces 1b and 2 are inwardly defined by a narrow dark line. On the upperside, the male is dull blue with two black subequal tornal spots on the hindwing, while, in the dull blue, dark-dusted female, the forewing is black bordered as usual in the group, and, of the black submarginal spots on the hindwing, that in space 2 is crowned with pale orange as below.

C. ancyræ has a wide distribution, ranging from Assam to Malaysia, and through the Archipelago to Australia and the islands of the south Pacific Ocean.

Genus *Petrelaea* Toxopeus

The single Indo-Australian representative of the genus differs from all species of *Nacaduba* in that the post-discal spot in space 2 on the forewing beneath is moved inwards, and is out of line with the spots in spaces 1b and 3. The narrow elongate androconial scales in *Petrelaea* are gradually thickened at both ends, and are quite different from those found in *Nacaduba*.

P. dana ranges from India to Malaya, and through the Archipelago to New Guinea, and a few species of *Petrelaea* occur in Africa.

P. dana dana (Nicéville) is found in lowland forest in Malaya, and, although males are not uncommon in the usual situations frequented by *Nacaduba*, the female is rarely taken. In the male the wings are violet-blue (greyish blue in a side light), and unmarked except for the narrow black borders; the female is brown, with a whitish area on the forewing, and iridescent blue scaling in the basal areas of both wings. On the greyish brown underside, the usual *Nacaduba* markings are faint and rather obscure; the two small, black, subequal, tornal spots on the hindwing afford a ready means of identifying the species. ♂ genitalia, Plate 12, fig. 175.

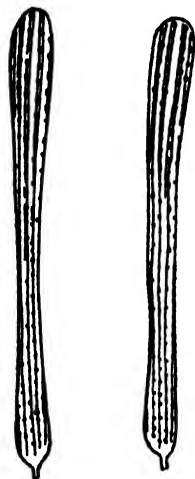


Fig. 118. *Petrelaea dana*.
Androconial scales.

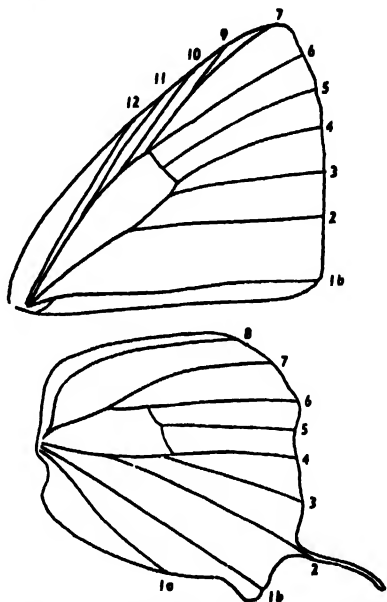


Fig. 119. *Heliophorus epicles* ♂. Venation.

Genus *Heliophorus* Geyer

In this genus, the species somewhat resemble *Theclinae* in appearance and habits.

In the male the wings are dark brown above, with the basal area shining purple, while the female is dark brown with orange areas.

The genus is chiefly Himalayan in distribution, but some species extend to Malaysia. The Malayan representatives are strictly montane. (Basic literature : Riley, 1929.)

Key for the separation of the species of *HELIOPHORUS*

- | | | | |
|---|--|---|-------------------|
| 1 | (2) ♂ upperside forewing with an orange patch beyond the cell-end. | ♀ upperside hindwing dark brown, with a uniform reddish orange distal border. | <i>H. epicles</i> |
| 2 | ♂ upperside forewing without an orange patch. | ♀ upperside hindwing reddish orange with the costal third black. | <i>H. ila</i> |

Heliophorus epicles indicus* (Fruhstorfer)Plate 45, figure 176 ♂***The Purple Sapphire**

The male has the wings above blackish brown, the forewing with the basal two-thirds deep lustrous purple, and an orange patch at the end of the cell, and the hindwing termen with an orange band which is inwardly strongly scalloped. The female is also dark brown above, with an orange discal band on the forewing, and the hindwing termen with a broad orange border. The wings below are deep yellow, and the bright red borders on the termens are inwardly margined with white lunules.

H. epicles is confined to the forested hills above 4,000 feet on the Main Range, and Cameron Highlands and Fraser's Hill are favoured localities. The butterfly, which has become commoner of recent years, frequents shrubs and bushes several feet from the ground near the forest edge. Sometimes a number are taken together.

The species is distributed from north-west India to western China, Formosa and Malaysia.

In the similar but rarer *H. ila malaya* Pendlebury, the male is without a reddish discal patch on the forewing, and the female is almost entirely orange above except for the forewing apical border and the hindwing costal border. The species, which is misspelt "*nila*" in some works, is known only from Malaya and Sumatra.

Genus *Hypochrysops* C. and R. Felder

The antennal club is more cylindrical than usual in the *Lycaeninae*; palpi with the third segment short and slender.

The only species of this Papuan genus found west of the Moluccas is *H. coelisparus*, which has been taken on very few occasions in Peninsular Siam, Malaya and Borneo, but is much less rare on the islands of the Riau Archipelago and on Nias. The male above is orange-red, the female paler, and, in both sexes, the forewing has costal and distal black borders, of which the latter is remarkably uniform; the hindwing has a black subcostal band and there are a few black submarginal spots. The underside is characteristic with green-edged reddish brown stripes.

H. coelisparus kerri Riley is very rare in Malaya, but was taken on Penang Hill over fifty years ago.

Subfamily THECLINAE

Adults moderate to rather large in size. They are usually solitary, and taken singly flying some feet above the ground, or settled on rather tall shrubs or trees; they are essentially forest insects, and several species are restricted to quite high elevations. Many species are very rare. A few, such as *Zelus amasa*, *Marmessus theda* and *Hypolycaena erylus*, may

be found settled at moist spots on forest roads, like many *Lycaeninae*, but such behaviour is exceptional.

Palpi usually smooth. Hindwing usually with space 1a produced to form a lobe. Hindwing usually with one to three tails which are broader than in the *Lycaeninae*, and long and filamentous in many species. In general, vein 8 on the forewing is missing in both sexes, and, in some genera, vein 9 is absent also; in some species, the female has a vein less than the male. Only in the males of *Iraota*, *Amblypodia*, *Pratapa vidura* and three species of *Jacoona* are all veins present on the forewing.

On the upper surface, the wings are shining blue, purple or green, orange-red, brown or white in the male, and usually with comparatively narrow black bordering; when coloured, the female is paler and duller than the male, and with broader black borders, but the female of many species is dark brown, with a black-spotted white tornal area on the hindwing. The underside pattern is very variable, but, usually, each wing has a post-discal band and marginal fasciae, and there may be cell and cell-end spots, as well as sub-basal markings on the hindwing.

In many genera the males have secondary sexual characters which often comprise areas of specialised scales on the upperside of the forewing, and, more frequently, there are areas of specialised scales in the costal area of the hindwing associated with a hair-tuft in the dorsal area on the forewing beneath. No androconial scales are present, except in *Drina maneia*.

The male genitalia show sufficient specific distinctness in many groups to be of great diagnostic value, but in some genera these organs are similar in allied species. It is disappointing, for example, to find that the male genitalia are of such little assistance in determination in the large and difficult genus *Arhopala*. In general, the male genitalia in the Theclinae show less specific differentiation than is the case in the *Lycaeninae*.

As in the *Lycaeninae*, the differences between allied genera are not always clearly defined.

Key for the separation of Genera of THECLINAE

- 1 (2) Palpi hairy beneath. Forewing vein 7 arising from vein 6. Eyes hairy. Hindwing with a tail at vein 2. Forewing vein 8 absent. Underside with post-discal and submarginal bands, and the black subternal spot in space 2 on the hindwing completely and evenly surrounded with orange. *Thecla*
- 2 Palpi smooth beneath (except in *Calapascilma*). Forewing vein 7 from the cell (fig. 120).
- 3 (4) Hindwing tailless. Forewing vein 7 ends on the termen (fig. 120). Eyes hairy. Upperside orange-red; underside silvery white with obscure fasciae. *Curetis*
- 4 Hindwing usually tailed. Forewing vein 7 ends on the costa (fig. 124) (except in *Amblypodia* and *Jacoona anarsija*, and in males of species in which all forewing veins are present).
- 5 (12) Forewing veins 5 and 6 bent towards each other at their origins (figs. 121 and 124). Eyes smooth. Wings rather quadrate. Upperside shining blue or purple, ♀ usually with broader black borders.
- 6 (9) Hindwing with a lobe and a tail at vein 1b (fig. 121).
- 7 (8) Forewing veins 5 and 6 arise from a point (fig. 121). Underside with silvery white markings. *Iraota*
- 8 Forewing veins 5 and 6 separate at their origins. Underside dark brown, with a darker line running from the forewing apex to the mid-dorsum on the hindwing. *Amblypodia*

- 9 Hindwing not tailed at vein 1b but usually lobed (fig. 124).
- 10 (11) Hindwing costa concave and apex very pointed (fig. 123). Hindwing tail at vein 2 spatulate. Underside dark purple-brown with obscure markings. *Mahathala*
- 11 Hindwing costa arched as usual and apex rounded (fig. 124). Hindwing tail at vein 2 (when present) not spatulate. Underside markings normally comprise dark spots laterally defined by narrow pale buff lines. *Arhophala*
- 12 Forewing veins 5 and 6 more or less parallel, with vein 5 usually nearer to vein 6 than to vein 4 (fig. 125).
- 13 (50) Eyes smooth.
- 14 (23) Hindwing usually tailed at vein 2, and without a tail at vein 1b.
- 15 (18) Hindwing tailed or toothed at vein 3 (may be obsolete in *Surendra todara* ♀), and with a short tail (less than 5 mm.) at vein 2 (except in *Surendra florimel*). Upperside shining purple-blue. Underside dark brown, with narrow post-discal lines, and metallic scaling at the hindwing tornus.
- 16 (17) Hindwing with not more than a short tooth at vein 3 (fig. 125). Forewing excavated below the apex (only slightly so in *S. todara*). Hindwing without an orange-red tornal area. *Surendra*
- 17 Hindwing with slender filamentous tails at veins 2 and 3 in ♂ and at veins 2, 3 and 4 in ♀, that at vein 2 being the longest. Forewing termen evenly rounded. Hindwing with an orange-red tornal area. *Semanga*
- 18 Hindwing not tailed or toothed at vein 3 but with a long, or moderately long, tail at vein 2 (fig. 126).
- 19 (22) Hindwing tail at vein 2 longer than 8 mm. Hindwing dorsum excavated before the pronounced lobe. Upperside orange-red, underside orange-yellow.
- 20 (21) Forewing vein 9 present (fig. 126). Forewing termen almost straight. *Loxura*
- 21 Forewing vein 9 absent. Forewing termen rounded. *Yasoda*
- 22 Hindwing tail at vein 2 between 5 and 8 mm. Hindwing dorsum not excavated, and the lobe not pronounced (fig. 127). Underside with the whole, or at least the basal two-thirds, of the wings silvery white. *Drina*
- 23 Hindwing tailed at vein 1b as well as at vein 2.
- 24 (27) Hindwing tails at veins 1b and 2 equal or nearly so (fig. 128).
- 25 (26) Forewing vein 11 strongly bent towards vein 12. Upperside hindwing with an orange tornal area. Underside pale yellow with transverse silvery bands. *Spindasis*
- 26 Forewing veins 11 and 12 more or less parallel (fig. 128). Upperside blue with black borders. Underside usually buff brown, with narrow post-discal lines, and an orange-crowned black tornal spot in space 2 on the hindwing. (Underside aberrant in *P. maculatus*.) *Pratapa*
- 27 Hindwing tails at veins 1b and 2 not more or less equal (fig. 129).
- 28 (35) Hindwing tail at vein 1b longer than that at vein 2.
- 29 (34) Forewing vein 9 long, with its origin before the end of vein 10.
- 30 (31) Forewing longer than 24 mm. Hindwing much produced at the tornus. Upperside pale blue with a greenish tinge. Underside greyish brown, with the dark brown post-distal bands nearer the termen than the cell-end. *Purlisa*
- 31 Forewing less than 24 mm. Hindwing not much produced at the tornus. ♂ upperside blue or green, with a black apical border. ♀ upperside dark brown, with black spots on the whitened tornal area of the hindwing.
- 32 (33) ♂ without secondary sexual characters (other than a cellular patch of raised scales on the upperside of the forewing in *C. jalindra*). Underside hindwing black tornal spot in space 2 inwardly crowned with orange or orange-brown. Underside white or pale yellow, with the distal thirds shaded reddish brown. *Charana*
- 33 ♂ with secondary sexual characters on the upper surface. Underside hindwing black tornal spot in space 2 not orange-crowned. Underside ochreous, or white shaded with ochreous, and the tornal markings on the hindwing entirely black, except for slight blue scaling in some species. *Jacoona*
- 34 Forewing vein 9 short, with its origin after the end of vein 10. Underside white, with the forewing apical area reddish brown, and the hindwing with one (♀) or two (♂) black costal spots. *Suasa*
- 35 Hindwing tail at vein 2 distinctly longer than that at vein 1b (fig. 129). Hindwing usually tailed or toothed at vein 3.
- 36 (45) Hindwing tail at vein 2 longer than, or as long as, the hindwing termen (fig. 129).
- 37 (38) Forewing origin of vein 5 much nearer to vein 6 than to vein 4. Hindwing produced at the tornus and only slightly excavated above the lobe. White, with a black apical border on the upperside of the forewing. *Neomyrina*
- 38 Forewing origin of vein 5 almost midway between veins 4 and 6 (fig. 129). Hindwing not produced at the tornus, but strongly excavated above the lobe. Upperside not white.
- 39 (44) Forewing vein 8 absent, vein 9 present (fig. 129).

- 40 (41) Forewing excavated at vein 6. Upperside violet blue in ♂, dark brown in ♀. Underside buff brown in ♂, orange in ♀. *Ticherra*
- 41 Forewing not excavated at vein 6.
- 42 (43) Forewing vein 9 arises well before the end of vein 10 (fig. 129). Upperside brownish purple in ♂, dark brown in ♀. Underside white, with the apical areas tinged ochreous. *Cheritra*
- 43 Forewing vein 9 arises just below the end of vein 10. Upperside hindwing with a broad black bar across the whitened tornal area. Underside ochreous or greyish brown, with the tornal half of the hindwing white, and across which is an unbroken black line from near the costa to the mid-dorsum, and an irregular black submarginal line, overlaid with lustrous green or blue scales. *Ritra*
- 44 Forewing veins 8 and 9 absent (fig. 130). Underside rich orange brown, with the black spotted, whitened, tornal half of the hindwing separated by a narrow, black, sinuate line. *Eooxylides*
- 45 Hindwing tail at vein 2 not as long as the hindwing termen (fig. 131).
- 46 (49) Hindwing tail at vein 2 comparatively broad and fluffy as usual in the Theclinae, and the tail at vein 3, when present, distinctly shorter than that at vein 1b (fig. 131).
- 47 (48) Hindwing toothed but not tailed at vein 3. Forewing veins 8 and 9 absent. Underside uniformly orange or reddish brown, with a narrow sinuate post-discal line. *Thamala*
- 48 Hindwing with a short fluffy tail at vein 3 (fig. 131). Forewing vein 8 absent, vein 9 present or absent. Underside forewing usually orange, and hindwing mostly white, with numerous dark markings comprising short thick stripes or double lines. *Marmessus*
- 49 Hindwing tail at vein 2 slender and filiform, and the tail at vein 3 nearly as long as that at vein 1b. Underside ochreous with broad white discal bands. *Horaga*
- 50 Eyes hairy.
- 51 (52) Palpi hairy beneath. Hindwing with three comparatively short, filiform tails at veins 1b, 2 and 3. Underside buff or ochreous, with the dark, reddish brown markings edged with silvery green. *Catapacilma*
- 52 Palpi smooth. Hindwing without a tail at vein 3 (except *Sithon* ♀, which has a very short, fluffy tail at vein 3).
- 53 (60) Hindwing tail at vein 1b longer than that at vein 2 (fig. 132) (only slightly so in *Chliaria* and *Ramelana*).
- 54 (59) Forewing veins 8 and 9 absent (fig. 132).
- 55 (58) Hindwing tail at vein 1b not twice as long as that at vein 2 (fig. 132).
- 56 (57) Antennal club abrupt, flattened and hollowed beneath. Forewing veins 11 and 12 bowed towards each other and almost touching. Upperside blue or purple in ♂, dark brown or white in ♀. Underside subapical areas shaded ochreous brown, or with the post-discal bands broadened towards the costa. *Chliaria*
- 57 Antennal club cylindrical as usual. Forewing veins 11 and 12 more or less parallel (fig. 132). Upperside dark brown or shining blue in ♂, dark brown, with black spotted whitish or orange tornal area in ♀. Underside very similar to some species of *Chliaria*. *Hypolycaena*
- 58 Hindwing tail at vein 1b about twice as long as that at vein 2. Underside pale bluish white with reddish brown post-discal lines, black tornal spots on the hindwing, and the apical areas of both wings shaded ochreous. *Zeltus*
- 59 Forewing vein 8 absent and vein 9 present (fig. 133). Wings rather quadrate. Upperside lustrous purple, with broad black borders. Underside hair brown, with narrow, dark brown, post-discal lines, and the hindwing with two black tornal spots and prominent metallic green scaling. *Ramelana*
- 60 Hindwing tailed at vein 2 and only a pendulous lobe at vein 1b (fig. 134). Forewing vein 8 absent and vein 9 present (except in *Sithon*, where both veins are missing).
- 61 (68) Forewing vein 9 long, arising well before the end of vein 10 (fig. 134).
- 62 (63) ♀ hindwing tail at vein 2 long (about 7 to 9 mm.), white and strongly ciliated. Upperside hindwing lobe green. Underside green with white post-discal fasciae. *Aritips*
- 63 Both sexes with a comparatively short, slender tail at vein 2. Upperside hindwing lobe not green. Underside not green.
- 64 (65) Forewing veins 11 and 12 more or less parallel, and veins 6 and 7 arising from a point at, or just beyond the cell-end. ♂ with secondary sexual characters. Underside with dark, macular, post-discal bands, the spot at the cell-end on the hindwing double, and with a dark spot near the base of space 7 on the hindwing. Larva feeds in the interior of fruits. *Viraehola*
- 65 Forewing veins 11 and 12 bowed towards each other, and vein 7 usually arising before the cell-end (fig. 134). Underside hindwing cell-end spot not double, and no dark spot near the base of space 7 (except in *Rapala subguttata*).

- 66 (67) ♂ without secondary sexual characters. ♂ upperside coppery red with the forewing cell entirely black. ♀ upperside dark brown, and tornal area of the hindwing whitened only in *D. hypargyria*. Underside post-discal fasciae broad and defined by white striae (*D. epijarbas*), or whitish, and unmarked except for black spotting in tornal area of the hindwing (*D. hypargyria*). Larvae feed in the interior of fruits. *Dendrox*
- 67 ♂ upperside hindwing with a brand, and underside forewing with a hair tuft in the dorsal area (fig. 134). ♂ upperside, when red, with, at least, the lower distal end of the forewing cell not blackened. ♀ upperside bluish or brown. Underside not as above. Larvae feed on leaves. *Rapala**
- 68 Forewing vein 9 short (absent in *Sithon*), arising just below or beyond the end of vein 10 (fig. 135).
- 69 (74) Forewing vein 8 absent, vein 9 present; veins 11 and 12 separated but bowed towards each other (fig. 135). ♀ hindwing not tailed at vein 3.
- 70 (71) Hindwing lobe small. Underside forewing without a dark bar at the base of the cell or below the cell. Underside apical area of the forewing shaded reddish brown, and both wings with cell-end spots and post-discal fasciae. *Sinthusa*
- 71 Hindwing lobe elongate and pendulous. Underside forewing with a dark brown spot at the base of the cell (*Bindahara*), or a black bar below the cell (*Araotes*).
- 72 (73) Hindwing tail at vein 2 long (at least 12 mm.), and hindwing tornus produced. Underside buff brown (♂) or white, with the apical area of forewing ochreous brown (♀); the forewing with a broad chocolate transverse bar across the cell, and a broad chocolate post-discal band, decreasing towards the tornus. *Bindahara*
- 73 Hindwing tail at vein 2 short (5 mm. or less), and hindwing tornus not produced. Underside forewing ochreous buff, with a broad white discal bar. *Araotes*
- 74 Forewing veins 8 and 9 absent; veins 11 and 12 touching (fig. 136). ♀ with a short tail at vein 3. ♂ underside white with distal halves chocolate-brown. ♀ underside forewing reddish ochreous, hindwing white with the apical half reddish ochreous. *Sithon*

Genus *Thecla* Fabricius

This genus is strongly represented in the Palaearctic Region, and, in the Oriental Region, it attains its greatest development in the mountainous parts of northern India and Assam; no true species of the genus are found in Africa south of the Sahara Desert, in tropical America, or in Australia. A single species *T. absolon*, occurs at high altitudes in Malaya and the Large Sunda Islands; it is very rare, but appears to be least so in Java.

On the upperside, the male of *T. absolon malayica* Pendlebury is a brilliant metallic green, with black borders on both wings; the female is brown, with orange streaks beyond the cell on the forewing. The underside is brown, with a purple glaze, and both wings have a narrow, regular, white, post-discal band which is inwardly shaded with dark brown on the forewing. The forewing has an orange subternal area; the hindwing has two irregular, whitish, submarginal lines, and the black submarginal spot in space 2 is surrounded with a deep orange ring.

Genus *Curetis* Hübner*

The species of *Curetis* form a homogeneous group which is rather isolated from the rest of the Theclinae; indeed, Bingham separated them as the subfamily Curetinae. The butterflies are rather large, the female has paler and broader black bordering, and, in some forms, the red colour on the upperside of the female is replaced by white.

The male genitalia show specific differentiation, and are characterised by the long and broad uncus and tegumen, the short and stout aedeagus,

* The treatment of this genus has been amended by Brigadier Evans in accordance with his published revision (Evans, 1934).

and, chiefly, by the finger-like valva (with the distal third clothed with hair), which is united with a broad, rounded style (see Plate 12, figs. 176-182).

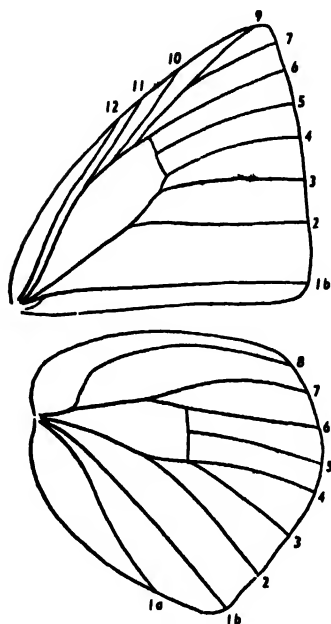


Fig. 120. *Curetis bulis* ♂. Venation.

The genus is distributed from Ceylon and India to Japan, and through the Archipelago to New Guinea and the Solomons. The distribution of *C. thetis* (Drury) is curious: this species ranges from Ceylon to the Solomon Islands, but the only specimens in the British Museum from Malaysia are five males and six females from Sumatra and Malaya.

(Basic literature: Toxopeus, 1935*a*; Corbet, 1937*d*; Evans, 1954.)

Key for the separation of the species of *CURETIS*

- 1 (8) Underside forewing post-discal band diagonally placed and pointing to the apex.
- 2 (3) Upperside hindwing the entire costa black-bordered. *C. sperthis*
- 3 Upperside hindwing costa not black bordered.
- 4 (7) Female tawny.
- 5 (6) Forewing black apex arcuate. *C. felderi*
- 6 Forewing black apex angled. *C. santana*
- 7 Female white. *C. bulis*
- 8 Underside post-discal bands more or less parallel to the termen.
- 9 (10) Underside post-discal bands linear and regular on both wings. *C. insularis*
- 10 Underside post-discal bands comprising conjoined lunules, of which those in spaces 4 and 5 on the hindwing are out of line with the rest.
- 11 (12) Underside shining white; post-discal bands comparatively narrow, comprising black lunules, inwardly slightly shaded, and running almost straight from vein 1b or 2 to vein 6 on the forewing. *C. thetis sumatrana*
- 12 Underside greyish white, with a matt surface; post-discal bands inwardly shaded and the lunules in spaces 4 and 5 on the forewing with their outer edges out of line with the lower part of the band.
- 13 (16) Underside post-discal bands rather narrowly shaded as usual, and the wings not dark-dusted.
- 14 (15) Underside forewing post-discal lunules in spaces 4 and 5 with their outer edges moved right out of line, and the outer edge of the band forming a right angle at vein 4. ♂ forewing apex rather rounded. *C. tagalica japa*
- 15 Underside forewing post-discal lunules in spaces 4 and 5 with their outer edges not much out of line, and the outer edges of the lunules on each side of vein 4 meeting at an acute angle. ♂ forewing apex pointed. *C. regula*
- 16 Underside post-discal bands broad and heavily dark-dusted, and both wings dark-dusted. *C. santana*

Curetis santana malayica (C. and R. Felder)

Plate 45, figure 177 ♂

The Malayan Sunbeam

In the usual form of the male (form *malayica*), the wings are bright coppery red, with the black distal border on the forewing continued along the dorsum; the tornal third of the hindwing is blackened, and

there is a broad black stripe above the cell. This hindwing stripe is absent in ♂-form *honesta* Fruhstorfer. The female is paler than the male, and the wing margins are broadly bordered with black, only a small, crescentic, orange area being present on the hindwing. The silvery white underside has obscure fasciae on both wings, and the forewing post-discal band runs obliquely from near the apex towards the dorsum.

The larva is velvety green, with a pale yellow lateral line; the IIIrd thoracic and 1st abdominal segments have narrow, oblique, lateral, crimson stripes, which are posteriorly edged with yellow, and there is a dorsal stripe of the same colour running from the 3rd to the 8th abdominal segments; there is a white, quadrate, lateral patch on the 6th segment. The subanal segment has a pair of slightly divergent, greenish yellow, erect processes from which can be protruded a pair of tentacles, with a tuft of black and white hairs at their apices, which can be whirled round and withdrawn with great rapidity. It does not appear that the larvae are associated with ants. The above description is adapted from one made by Colonel C. T. Bingham from larvae found on *Pongamia pinnata* at Mergui.

C. bulis bulis (Westwood) (Plate 45, figure 178 ♂) is a very similar species, and about equally common. The female is black and white above, and much less frequently found than the male. This is the only *Curetis* with a black and white female in Malaya.

These two species are widely distributed in Malaya, frequenting forest roads, river banks and similar places, and the males are often found congregated at moist spots. The females also are low-flying. They occur at all usual elevations, but are more often found on the plains than at higher altitudes.

C. santana is recorded from north Burma to Java and Borneo, while *C. bulis* extends also to India and Hainan.

The remaining species in this group, apart from the rare *C. felderi* Distant, is *C. sperthis*, which has a similar range abroad to *C. santana*, but is not so common. In *C. sperthis sperthis* (C. and R. Felder), the costal margin of the hindwing of the male upperside is entirely black above the cell and vein 7.

In the remaining Malayan species of *Curetis*, the post-discal band on the forewing beneath is more or less parallel to the termen. All are confined to the lowlands and one is known only from Pulau Tioman. *C. insularis* (C. and R. Felder), which is represented throughout Malaysia, can be readily recognised by the very narrow, almost linear, post-discal bands. The post-discal bands are very broad and heavily shaded in the Tioman *C. tagalica labuana* Evans, which sub-species is otherwise confined to Labuan and the nearby islands. The other species, which are characterised by a moderately broad post-discal band can be separated by the characters given in the key. *C. tagalica jopa* Fruhstorfer is not uncommon, and *C. regula* Evans is hardly less so,

although females appear to outnumber males ; both species are confined to Neomalaya. *C. thetis sumatrana* Corbet, from Malaya and Sumatra, is the rare Neomalayan representative of a species which ranges from India to the Solomon Islands, and is abundant in the Andaman and Nicobar Islands.

(Basic literature : Evans, 1954.)

Genus *Iraota* Moore

The species can be recognised immediately by the underside of the wings, which is ferruginous, with dark purple-brown areas and silvery white streaks and spots. The genus is distributed from Ceylon and India to south-east China, and through the Malay Archipelago to New Guinea.

In *I. timoleon* and *I. rochana*, the male has a small black hair-tuft in the basal third of the dorsum on the underside of the forewing, and a small area of specialised scales around the base of space 7 on the upperside of the hindwing.

I. distanti distanti (Staudinger) is the commonest of the Malayan species, and may be taken in forest at all elevations. Above, the male is black, with shining blue or green streaks between the veins, while the female is bright steely purple-blue, with obscure black distal borders. On the underside, *I. distanti* differs from its congeners in lacking both a silvery streak in the forewing cell and a broad silvery white patch in the costal area of the hindwing. The species is restricted to Neomalaya.

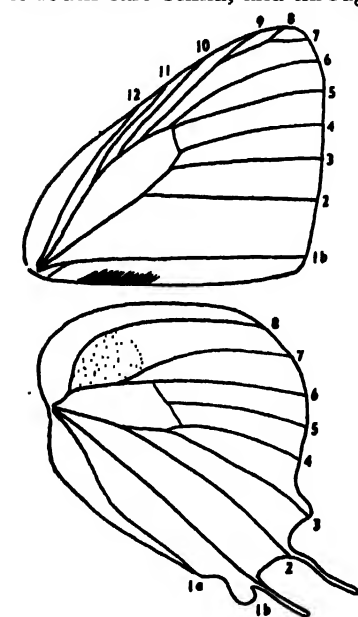


Fig. 121. *Iraota rochana* ♂. Venation.

I. timoleon flies from Ceylon and India to south China and Malaya, and the green larva feeds on *Ficus religiosa* and *F. glomerata* ; *I. rochana* is distributed from Assam and Burma through Malaya to Celebes.

Key for the separation of the species of *IRAOTA*

- 1 (2) Underside forewing without a silvery white streak in the cell. Underside hindwing with clearly defined silvery white spots, but without a white band in the costal half of the wing. *I. distanti*
- 2 Underside forewing with a silvery white streak in the cell (may be faint in *I. timoleon*). Underside hindwing may have a prominent white band or stripe in the costal half of the wing. *I. rochana*
- 3 (4) Underside hindwing with the silvery white subcostal band reaching the wing margin at the apex. *I. rochana*
- 4 Underside hindwing with the silvery white subcostal band, when present, not reaching the wing margin. *I. timoleon*

Genus *Amblypodia* Horsfield

The generic name *Horsfieldia* Riley falls to the older name *Amblypodia* Horsfield.

The species are large and the genus is represented from Ceylon through the Archipelago to Papua and the Solomon Islands.

A. narada taooana Moore is uncommon in Malaya, and is taken singly in primary forest at moderate elevations. Above, the male is deep shining purple-blue, with the forewing black border increasing towards the apex ; the paler female is bluish purple with broader, diffuse, black borders on both wings. The species flies from south Burma to Malaysia, the Philippines and Celebes.

A. anita anita Hewitson occurs from Ceylon to Indo-China and Perlis ; curiously enough, a subspecies has been described from Java. The larva of *A. anita* feeds on young shoots of *Olex scandens* in Ceylon.

(Basic literature : Riley, 1922 : Corbet, 1940a.)

Key for the separation of the species of AMBLYPODIA

- 1 (2) ♂ upperside deep shining purple-blue, with the narrow, regular, black border on the forewing decreasing towards the tornus.
♀ upperside bluish purple with diffuse black borders (genitalia, Plate 12, fig. 184). *A. narada*
- 2 ♂ upperside brownish purple, with the forewing black border of uniform width.
♀ upperside dull blackish brown, with a basal purple patch on the forewing (genitalia, Plate 12, fig. 183). *A. anita*

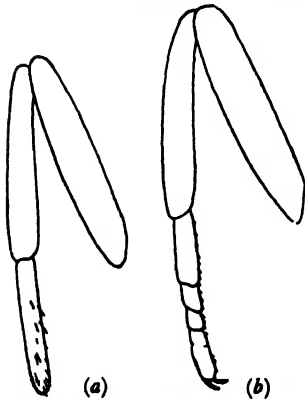


Fig. 122. *Mahathala ameria*
(a) Male. (b) Female fore-leg.

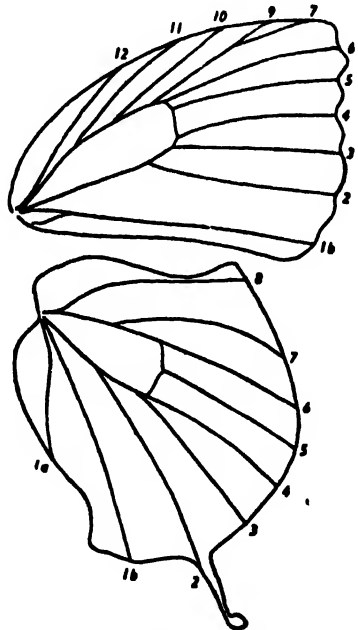


Fig. 123. *Mahathala ameria* ♂.
Venation.

Genus *Mahathala* Moore

The genus comprises a single species which is distributed from China and Formosa to Assam, Burma, Siam, Malaya, Sumatra and Java. In some subspecies of *M. ameria* the sexes are not easy to differentiate on

the wing pattern, but the fore-tarsus in the male consists of a single segment furnished with a number of bristles and rounded at the distal extremity; in the female the fore-tarsus is fully developed with five segments, and the terminal segment has two well-developed terminal claws. ♂ genitalia, Plate 12, fig. 185.

M. ameria uriadeva Fruhstorfer is rare in lowland forest in Malaya. The upperside is shining purple-blue, with black borders (about 1 mm. broad on the forewing termen in the male, and broader in the female); the underside pattern bears a general resemblance to that of an *Arhopala* species, but the three cell-spots on the forewing are indicated by short, yellowish, transverse stripes, and the post-discal fasciae on both wings are more confluent than is usual in *Arhopala*.

(Basic literature : Talbot, 1942.)

Genus *Arhopala* Boisduval

Sometimes known as *Amblypodia* Horsfield but the type of this latter genus has been shown to be *narada* Horsfield (Corbet, 1940a.)

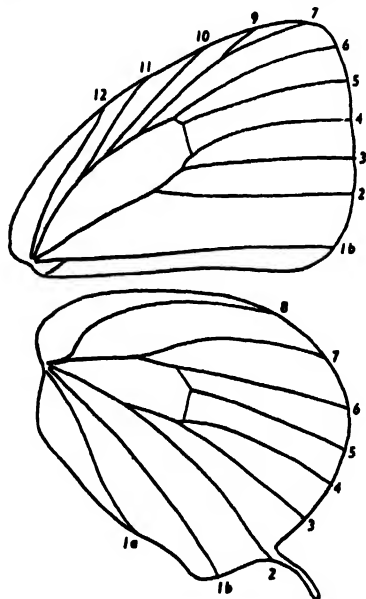


Fig. 124. *Arhopala eumolphus* ♂. Venation.

The numerous species comprising the genus *Arhopala* are remarkably similar both in structure and facies, and all attempts to divide the genus into smaller units have failed. Normally, both sexes are shining blue or purple above, with very narrow black borders in the male, and much broader bordering in the female. Usually, the underside is hair-brown, with darker rounded spots in the basal half of each wing, and with prominent, macular, post-discal fasciae and rather obscure submarginal bands. Most of the species have a short filamentous tail at vein 2 on the hindwing, and a few species have additional tails or teeth at veins 1b and 3. The status of some forms is still a matter of uncertainty. In order to facilitate identification the genus has been divided somewhat arbitrarily into groups of species.

In *A. atosia* and *A. epimuta* the male has a large, circular, discal patch of specialised scales on the upper surface of the forewing.

The male genitalia are quite uniform in pattern, and only in the *apidanus* group is an uncus present. The "dorsal hooks" may be long

and slender, but are usually short and blunt. Often, the shape of the valvae is ill-defined, and some species show a marked individual variation in this respect. The aedeagus is characteristic in some species, and, except for *A. democritus*, and possibly *A. anella* (male unknown), all species of the *democritus* group have the aedeagus strongly angled at the distal end: a large, spiny cornutus is present in the aedeagus of the species in the *apidanus* group.

In most species of *Arhopala* the male genitalia resemble those figured for *A. anthelus*, *A. muta* and *A. moolaiana*; the genitalia of all species are figured (Plates 12, 13 and 14, figs. 186–213) in which these organs are sufficiently distinct to serve for purposes of identification.

The tailed *A. atosia* and the similar but tailless *A. epimuta* have identical male genitalia, and the same obtains with regard to *A. pseudomuta* (tailed) and *A. amphimuta* (tailless). *A. muta*, *A. moorei*, *A. wallacei*, *A. tropaea*, *A. avatha*, *A. avathina* and *A. zylde* in the *epimuta* group cannot be separated on genitalia, and the separation of the first four on facies is not easy. Except for *A. ace* and *A. agrata*, the species of the *agaba* group cannot be differentiated on genitalia, and, except for the name-type, such is the position also in the *abseus* group. *A. eumolphus*, *A. horsfieldi* and *A. bazalus* have the male genitalia of a similar, if not identical pattern.

The butterflies are unobtrusive in habit, spending much time settled on the leaves of bushes and shrubs some 6 to 10 feet from the ground, and making only occasional short flights. It may be with many species that rarity is more apparent than real, but it is certain that some species are very scarce, and are known only from one or two examples. The *Arhopala* species are essentially denizens of the lowland forest. Evidently the genus had three main centres of distribution, these being respectively in Assam-Burma, Neomalaya and the Papuan subregion. Of the 111 described Indo-Malayan species, only three have spread further east than the Philippines. The genus is represented from Ceylon and India to south China, and through the Malay Archipelago to New Guinea, Australia and the Solomon Islands; one or two species have even reached Japan.

Geographical variation in *Arhopala* is quite marked, and admits of several important generalisations. As compared with Burma and Java, where seasonal effects are evident, the sexes from Neomalaya have the forewing more rounded and with blunter apex, the upperside less shining and more purple, and the underside duller, with the markings more uniform and less contrasted; usually, any purple gloss on the underside of the Burmese and Javanese races is absent from the corresponding Neomalayan forms. In the male, the forewing black border decreases in width on passing from Burma to Malaya, Sumatra and Borneo, while the reverse is the case with the female black bordering, the Bornean race having the broadest, and the Burmese race the narrowest borders. Where distinct races occur in the Langkawi Islands, these are intermediate

between those from south Burma and Malaya proper, although usually closer to the Burmese form. The Kedah form is often intermediate between the Langkawi and Malayan races when these differ.

(Basic literature : Corbet, 1941g, 1946a.)

Key for the separation of Groups in the Genus *ARHOPALA*

- 1 (22) Underside forewing with three normal cell-spots.
- 2 (9) Underside hindwing post-discal spots in spaces 5, 6 and 7 with their centres in line, the spots in spaces 6 and 7 more or less in echelon, and the inner edge of the spot in space 6 more or less in line with the outer edge of the spot in space 7.
- 3 (6) Underside forewing with a well-defined dark area under the cell, defined outwardly by an irregular white line; the post-discal band broken or angled at vein 4 and the upper portion curved. Hindwing tailed.
- 4 (5) Underside forewing cell spots not confined to the cell, one or more being continued above the radius. (*anthelus* group)
- 5 Underside forewing cell spots not continued above the radius and vein 9, and at most a single costal spot. (*camdeo* group)
- 6 Underside forewing without a dark area under the cell, but often a more or less obscure dark spot under the central cell spot.
- 7 (8) Hindwing tailed. (*aedias* group)
- 8 Hindwing tailless. (*epimula* group)
- 9 Underside hindwing post-discal spots in spaces 5, 6 and 7 with their centres not in line, those in spaces 6 and 7 more or less quadrate and conjoined.
- 10 (21) Underside forewing without a spot at the base of space 11 between the basal and central cell spots.
- 11 (18) Underside hindwing post-discal band completely dislocated at vein 2.
- 12 (17) Hindwing tailed.
- 13 (14) Underside forewing post-discal band almost completely broken at vein 4, and the spot in space 4 moved towards the termen; a costal spot present in space 10 (except in *A. anella*), and, usually, a costal spot in space 11 and a basal spot in space 10. (*democritus* group)
- 14 Underside forewing post-discal band not much dislocated at vein 4, the spot in space 4 not out of line, and never more than a single costal spot (in space 10 over the cell-end spot).
- 15 (16) Forewing longer than 21 mm. Underside hindwing post-discal spot in space 6, usually, with the outer edge oblique and well inside the inner edge of the spot in space 5. (*silhetensis* group)
- 16 Forewing less than 21 mm. Underside hindwing post-discal spot in space 6, usually, with the outer edge more or less joining the inner edge of the spot in space 5. (*agaba* group)
- 17 Hindwing tailless. Underside forewing post-discal band confluent, and may be bent at vein 4. (*perimula* group)
- 18 Underside hindwing post-discal band not completely dislocated at vein 2.
- 19 (20) Hindwing tailed. (*centaurus* group)
- 20 Hindwing tailless. (*agelastus* group)
- 21 Underside forewing with a costal spot at the base of space 11 between the basal and central cell spots; also costal spots over the central and cell-end spots. (*abseus* group)
- 22 Underside forewing with markings abnormal, and the usual three cell spots cannot be distinguished.
- 23 (24) Underside forewing with dark bands across the costal half of the wing. (*apidanus* group)
- 24 Underside forewing unmarked, except for obscure post-discal and submarginal fasciae. (*fulla* group) (*A. fulla*, sole species)

Key for the separation of the species of the *ANTHELUS* Group

- 1 (6) Underside forewing post-discal band partially dislocated at vein 4.
- 2 (5) Underside forewing without a dark spot above the basal cell spot.
- 3 (4) Underside forewing without a spot at the base of space 10, but with a white annular spot in the centre of space 11. Underside with the costal portion of both wings darkened. *A. ijauensis* (20.0 mm.)
- 4 Underside forewing with a spot at the base of space 10 above the central cell spot, and without a spot in space 11. Underside costal areas not darker than the rest of the wing. *A. achelous* (21.0 mm.) (Plate 49, figure 258)
- 5 Underside forewing with a prominent spot at the base of space 11 above the basal cell spot, and also a large dark spot over the central cell spot. *A. anthelus* (27.0 mm.)
- 6 Underside forewing post-discal band completely broken at vein 4, and the upper portion oblique. *A. anarta* (29.0 mm.)

Key for the separation of the species of the CAMDEO Group

- 1 (10) Underside forewing post-discal band partially dislocated at vein 4.
- 2 (5) Underside forewing inner edge of the spot in space 4 over the middle of the spot in space 3.
- 3 (4) Forewing less than 25 mm. Underside crimson-brown, markings confluent and apices slightly whitened. *A. myrzala* (21.5 mm.) (Plate 49, figure 259)
- 4 Forewing longer than 25 mm. Underside uniform hair-brown, with a slight ochreous hue, the post-discal markings usually annular, but the forewing spots may be confluent. *A. hellada* (28.0 mm.)
- 5 Underside forewing inner edge of the spot in space 4 touching the outer edge of the spot in space 3.
- 6 (9) Underside not crimson brown or white.
- 7 (8) Underside rather pale buff brown, ♂ upperside greyish blue, with a slight frosted appearance, and with very narrow black borders. *A. camdeo* (21.0-25.0 mm.)
- 8 Underside deeper and more ochreous brown. ♂ upperside lustrous purple, with very narrow black borders; forewing 23 mm. *A. azata* (23.0 mm.) (Plate 49, figure 260)
- 9 Underside usually some shade of crimson brown, but the only known Malayan specimen (♀) has the underside white. *A. dispar* (25.0 mm.) (Plate 49, figure 261)
- 10 Underside forewing post-discal band completely broken at vein 4. *A. johoreana* (18.0 mm.) (Plate 49, figure 262)

Key for the separation of the species of the AEDIAS Group

- 1 (4) Underside forewing with the post-discal spot in space 4 moved out of line with the spots in spaces 3 and 5. Underside hindwing post-discal spots in spaces 4 and 5 not aligned to form a short stripe.
- 2 (3) Underside hindwing post-discal band partially dislocated at vein 2. ♂ upperside forewing without an area of modified scales. Usually, forewing longer than 22 mm. *A. aedias* (24.0 mm.)
- 3 Underside hindwing post-discal band completely dislocated at vein 2. ♂ upperside forewing with a discal area of modified scales. Forewing less than 22 mm. *A. atosa* (21.5 mm.)
- 4 Underside forewing with the post-discal spot in space 4 not moved out of line with the spots in spaces 3 and 5. Underside hindwing post-discal spots in spaces 4 and 5 aligned to form a short stripe.
- 5 (6) Underside hindwing post-discal spots in spaces 6 and 7 circular, and much darker than the ground. *A. pseudomula* (21.0 mm.)
- 6 Underside hindwing post-discal spots in spaces 6 and 7 rather rectangular, and only slightly darker than the ground. *A. allata* (21.0 mm.) (Plate 50, figure 267)

Key for the separation of the species of the EPIMUTA Group

- 1 (18) Underside hindwing post-discal band completely broken at vein 2. Underside forewing post-discal band usually dislocated at vein 4.
- 2 (17) Underside forewing post-discal spot in space 3 more or less circular as usual, and the post-discal spots below vein 3 present as usual.
- 3 (10) Underside forewing post-discal spot in space 2 not moved out of line with the spot in space 3.
- 4 (7) Underside forewing post-discal spot in space 4 moved out of line with the spots in spaces 5 and 6. Forewing longer than 16.5 mm.
- 5 (6) ♂ upperside deep shining purplish blue. ♀ upperside deep purple, with broad black borders, that on hindwing nearly 3 mm. wide at vein 3. Underside post-discal fasciae usually comprising separated spots. *A. hypomula* (17.5 mm.)
- 6 ♂ upperside shining blue or bluish purple, with a large discal area of specialised scales on the forewing. ♀ upperside blue or purple-blue, with the hindwing black border rarely exceeding 2 mm. at vein 3. *A. epimuta* (21.0 mm.)
- 7 Underside forewing post-discal spot in space 4 completely in line with the spots in spaces 5 and 6. Forewing not longer than 16.5 mm.
- 8 (9) Underside hindwing submarginal lunules faint and not clearly defined. ♂ upperside forewing deep violet-purple, hindwing shining blue, greenish in a side light. *A. metamula* (16.0 mm.)
- 9 Underside hindwing submarginal lunules prominent, darker than the ground, and outlined with narrow pale buff lines. ♂ upperside uniform bluish purple. *A. avathina* (14.5 mm.)

- 10 Underside forewing post-discal spot in space 2 moved out of line, its inner edge nearer the outer than the inner edge of the spot in space 3. ♂ upperside forewing with a black uniform distal border 1 to 2 mm. wide.
- 11 (12) ♂ upperside hindwing paler and clearer blue than the forewing. ♀ upperside shining blue or purple-blue, black bordering comparatively narrow, that on the hindwing increasing towards the apex and tornus, and that on the forewing with at least a trace of a black wedge-shaped mark beyond the cell. *A. muta* (17.0 mm.)
- 12 ♂ upperside forewing and hindwing the same colour in all lights. ♀ upperside more purple, and the black bordering broader on both wings.
- 13 (14) Forewing less than 14 mm. ♂ upperside rather dull bluish purple, with only a faint sheen. ♀ upperside bluer, and the hindwing border uniform and almost as broad as the forewing border. *A. tropaea* (13.0 mm.)
- 14 Forewing longer than 14 mm.
- 15 (16) ♂ upperside shining purple-blue, and with the hindwing black border narrower than the forewing border, and increasing towards the apex and tornus. ♀ upperside hindwing black border rather irregular, and increasing towards the apex and tornus. *A. moorei* (16.0-17.0 mm)
- 16 ♂ upperside shining purple-blue, with a silky sheen, and the hindwing black border at least as broad as the forewing border, and of uniform width. ♀ upperside hindwing black border broad and uniform. *A. wallacei* (17.0 mm.)
- 17 Underside forewing post-discal spot in space 3 very elongate and much moved inwards; post-discal band usually not continued below vein 3 (rarely to vein 2 in the ♀). ♂ upperside dull brownish purple, forewing black border a thread. *A. kurzi* (21.0 mm.) (Plate 50, figure 274)
- 18 Underside hindwing post-discal band partially dislocated at vein 2.
- 19 (36) Underside hair brown as usual.
- 20 (31) Underside post-discal markings comprising more or less confluent spots as usual.
- 21 (24) Forewing less than 17.5 mm.
- 22 (23) Underside forewing post-discal band narrow, less than 1 mm. wide. Underside hindwing post-discal spot in space 6 quadrate and moved inwards slightly, and post-discal spots in spaces 2 to 5 not forming regular and confluent band. ♂ upperside deep, shining violet blue, with broad, uniform, black borders (1.5 to 2 mm.). *A. awatha* (15.0 mm.) (Plate 50, figure 275)
- 23 Underside forewing post-discal band broader, more than 1 mm. wide. Underside hindwing post-discal spot in space 6 rounded and in line with the spots in spaces 5 and 7, and the post-discal spots in spaces 2 to 5 forming a regular and confluent band. ♂ upperside shining purple-blue, with narrower black borders. *A. zylda* (15.0-16.0 mm.) (Plate 51, figure 276)
- 24 Forewing longer than 17.5 mm.
- 25 (26) Upperside bright shining blue or purplish. Forewing apex very quadrate. *A. moalaiana* (19.0 mm.)
- 26 Upperside deep purple or purple-blue. Forewing apex rounded as usual.
- 27 (28) Underside forewing post-discal band dislocated at vein 4, and comprising two oblique portions; the outer edge of the spot in space 3 usually continuous with the inner edge of the spot in space 4. ♂ upperside forewing black border broad (1.5 to 2 mm.) and uniform. *A. agestilus* (21.0 mm.)
- 28 Underside forewing post-discal band forming a regular curve, or only slightly dislocated at vein 4, and usually broader than in *A. agestilus*.
- 29 (30) ♂ upperside purple, with forewing black border 0.5 to 1 mm. *A. amphimuta* (21.0 mm.)
- 30 ♂ upperside deep violet, with forewing black border a thread. *A. asia* (20.0-21.0 mm.) (Plate 51, figure 280)
- 31 Underside post-discal markings comprising large annular contiguous spots.
- 32 (33) Underside markings only slightly darker than the ground. Underside hindwing post-discal spot in space 3 elongate and moved inwards. ♂ ♀ upperside shining purplish blue, with broad regular black borders, that on the forewing increasing markedly towards the apex. *A. belphebe* (17.5 mm.)
- 33 Underside markings much darker than the ground. Underside hindwing post-discal spot in space 3 more rounded, and only slightly moved inwards. Upperside purplish blue, wing bases greenish, with a rather broad black apical border from the mid-coxal to the tornus on the forewing, sexes alike.
- 34 (35) Underside forewing post-discal markings not unduly large, may be obsolete. Aedeagus almost straight (Plate 13, figure 198 ♂ genitalia). *A. similis* (19.0 mm.) (Plate 51, figure 281)
- 35 Underside forewing post-discal markings comprising large elongate spots. Aedeagus sharply angled (Plate 13, figure 197 ♂ genitalia). *A. agestis* (20.0 mm.) (Plate 51, figure 282)

- 36 Underside crimson-purple, with the markings indicated by narrow white lines, and a prominent white spot in the middle of space 7 on the hindwing. ♂ upperside shining purple, with black borders about 1.5 to 2.0 mm. wide on the termen, broader at the apex of forewing. *A. myzalina* (15.0 mm.) (Plate 51, figure 283)

Key for the separation of the species of the DEMOCRITUS Group

- 1 (2) Forewing longer than 20 mm. Underside forewing post-discal band completely broken at vein 4 and the upper portion very oblique; the post-discal spots in spaces 2, 3 and 4 crescentic. Hindwing with a rather long tail at vein 2, a short tail at vein 3, and a short prolongation at vein 1b. ♂ unknown. *A. anella* (21.0 mm.)
- 2 Forewing less than 20 mm. Underside forewing post-discal band not completely broken at vein 4.
- 3 (4) Underside hindwing post-discal spot in space 6 large and outwardly strongly concave. Underside markings broken up and comprising lines and dashes. *A. democritus* (19.5 mm.)
- 4 Underside hindwing post-discal spot in space 6 outwardly convex.
- 5 (8) Underside forewing with a spot at the base of space 10 (over the central cell spot).
- 6 (7) Underside purple washed, post-discal spots annular and much darker than ground colour. *A. alitaeus* (17.0 mm.)
- 7 Underside hair brown. Post-discal spots more linear, as usual, and scarcely darker than the ground colour. *A. myrtale* (18.0-18.5 mm.)
- 8 Underside forewing no spot at the base of space 10, but with a spot in the distal half of space 11.
- 9 (12) Forewing apex acute and termen rather straight. ♂ upperside purplish blue with uniform black borders (about 1.0 mm. wide on the forewing termen).
- 10 (11) Underside purple-glazed, and with the reddish brown post-discal markings confluent. *A. atrax* (18.0 mm.) (Plate 51, figure 286)
- 11 Underside not purple-glazed, and the markings comprising more or less separated spots narrowly outlined with yellowish buff. *A. ariana* (20.0 mm.)
- 12 Forewing apex blunt and termen rounded. ♂ upperside deep lustrous purplish blue, with the black border a thread.
- 13 (14) Underside usually strongly purple washed, and the markings prominent and distinctly darker than the ground. *A. havilandi* (19.0 mm.) (Plate 51, figure 287)
- 14 Underside hair brown and not purple washed, and the markings hardly darker than the ground. *A. rafflesi* (19.0 mm.)

Key for the separation of the species of the SILHETENSIS Group

- 1 (4) Underside hindwing outer edges of the post-discal spots in spaces 2 to 5 not in line, the spot in space 3 being moved inwards. Underside forewing post-discal band slightly dislocated at vein 4, and the spot in space 3 moved inwards.
- 2 (3) Forewing longer than 22 mm. *A. silhetensis* (23.5 mm.)
- 3 Forewing not longer than 22 mm. Forewing apex rather blunter, and upperside bluer than in *A. silhetensis*. *A. zambra* (21.5 mm.)
- 4 Underside hindwing post-discal spots in spaces 2 to 5 in line, their outer edges forming a straight line. Underside forewing post-discal band not dislocated at vein 4, and more or less of uniform width throughout. *A. apha* (23.0 mm.)

Key for the separation of the species of the AGABA Group

- 1 (2) Underside rather dark brown, markings confluent, very broad, hardly darker than the ground, and with the inner and outer edges defined by very narrow, and rather straight, white lines. *A. ace* (20.0 mm.)
- 2 Underside not as above.
- 3 (14) Underside uniformly coloured rather dark ochreous brown.
- 4 (5) Underside markings dull, obscure and narrow. *A. agrata* (21.0 mm.)
- 5 Underside markings prominent and clearly defined.
- 6 (9) Underside forewing post-discal spot in space 3 moved inwards.
- 7 (8) Underside forewing both the inner and the outer edges of the spot in space 3 out of line with the adjacent spots (the outer edge is in line with the spots in spaces 2 and 4 in the Langkawi race); underside hindwing post-discal spot in space 6 with its outer edge oblique. ♂ upperside purr shining blue. *A. kowaga* (16.0-17.0 mm.)
- 8 Underside forewing the inner edge of the spot in space 3 in line with the inner edges of the spots in spaces 1b and 2; underside hindwing post-discal spot in space 6 with its outer edge straight and in line with the outer edge of the spot in space 7. Underside markings broader and more confluent than in allied species. ♂ upperside purple-blue. *A. agammon* (20.0 mm.)

- 9 Underside forewing post-discal spot in space 3 in line with adjacent spots.
- 10 (11) Underside hindwing post-discal spot in space 6 oblique. ♂ forewing termen rather rounded and apex rather blunt. ♂ upperside bluish purple, with forewing apex slightly blackened. *A. arua* (19.0 mm.)
- 11 Underside hindwing post-discal spot in space 6 quadrate, and conjoined with the spot in space 7. ♂ forewing termen rather straight and apex more pointed. ♂ upperside not as above.
- 12 (13) Underside markings distinctly darker than the ground. Underside hindwing post-discal spots in spaces 2 to 5 not in line. ♂ upperside deep lustrous blue. *A. phaeops* (17.0 mm.)
- 13 Underside with a glazed appearance, and the markings only slightly darker than the ground and sharply defined by pale yellowish narrow lines. Underside post-discal bands confluent, and the post-discal spots in spaces 2 to 5 on the hindwing in line. ♂ upperside blue to purple with a greyish hue. *A. azinis* (20.0 mm.) (Plate 52, figure 297)
- 14 Underside prominently purple washed.
- 15 (16) Underside forewing post-discal band outwardly irregular, and narrowing towards the tornus. ♂ upperside forewing black border narrow and almost uniform. *A. agaba* (20.0 mm.)
- 16 Underside forewing post-discal band more regular and comparatively uniform in width. ♂ upperside forewing black border usually about 1 mm. wide and increasing towards the costa. *A. alea* (19.0 mm.)

Key for the separation of the species of the PERIMUTA Group

- 1 (4) Underside pale hair-brown, with a slight ochreous hue, and the markings obscure.
- 2 (3) Underside forewing post-discal band confluent, more or less parallel with the termen, and hardly darker than the ground. Forewing longer than 17 mm. *A. inornata* (21.0 mm.)
- 3 Underside forewing post-discal band more macular, partially dislocated at vein 4 and the upper portion oblique, and the markings slightly but definitely darker than the ground. Forewing less than 17 mm. *A. antimula* (15.0 mm.)
- 4 Underside with a central yellowish band on the hindwing, and the basal area of the hindwing and the termens of both wings shaded with purple. Underside forewing post-discal band confluent, with the upper portion bent towards the base of the wing. *A. perimuta* (15.0 mm.) (Plate 53, figure 300)

Key for the separation of the species of the CENTAURUS Group

- 1 (6) Underside forewing post-discal band forming a smooth curve (may be slightly sinuous in *A. cooperi*).
- 2 (3) Underside hindwing post-discal spot in space 6 with its outer edge convex. *A. barceni* (22.0-23.5 mm.)
- 3 Underside hindwing post-discal spot in space 6 with its outer edge concave.
- 4 (5) Forewing longer than 22 mm. Underside forewing cell-spots defined by silvery green lines. *A. centaurus* (27.0 mm.)
- 5 Forewing less than 22 mm. Underside forewing without silvery green lines. *A. cooperi* (18.0 mm.) (Plate 53, figure 309)
- 6 Underside forewing post-discal band bent, and even dislocated, at vein 4.
- 7 (12) Underside forewing post-discal band not dislocated at vein 4, and the spots in spaces 2 and 3 larger than the spots above vein 4. Underside hindwing post-discal spot in space 6 with its outer edge convex.
- 8 (9) Forewing longer than 21 mm. Underside forewing with a prominent, deep purple-brown area below the cell. ♂ upperside deep violet. *A. corinda* (22.0 mm.)
- 9 Forewing less than 21 mm. Underside forewing with the dark area below the cell not more prominent than usual. ♂ upperside bronzy green.
- 10 (11) Underside hair-brown. ♂ upperside hindwing black border very broad, at least 2 mm. at vein 6. *A. auria* (19.0-20.0 mm.)
- 11 Underside purple-brown. ♂ upperside hindwing black border usually a thread at vein 6. *A. trogon* (19.0-20.0 mm.)
- 12 Underside forewing post-discal band dislocated at vein 4 (only slightly so in *A. vihara*), and the upper portion usually more oblique.
- 13 (20) Underside hair-brown, with the usual markings.
- 14 (15) Underside hindwing post-discal spot in space 6 separate and rounded. *A. vihara* (22.0 mm.)
- 15 Underside hindwing post-discal spot in space 6 quadrate and conjoined with the spot in space 7.
- 16 (19) Underside hindwing post-discal spot in space 6 with its outer edge concave. ♂ upperside shining green.

- 17 (18) Underside hindwing post-discal spot in space 6 with its outer edge V-shaped. Underside forewing post-discal spot in space 4 moved out of line with the spots in spaces 5 and 6. ♂ upperside forewing black border less than 2 mm. broad. *A. eumolpus* (21.5 mm.)
- 18 Underside hindwing post-discal spot in space 6 with its outer edge usually not V-shaped. Underside forewing post-discal spot in space 4 usually more or less in line with the spots in spaces 5 and 6. ♂ upperside forewing black border more than 4 mm. broad. In both sexes, the underside tends to be darker than in *A. eumolpus*. *A. horsfieldi* (22.0-23.0 mm.)
- 19 Underside hindwing post-discal spot in space 6 with its outer edge straight. ♂ upperside lustrous brown, deep violet in some lights, and termen broadly lustrous purple. ♀ upperside brown, slightly tinged with lilac. *A. bella* (21.0 mm.) (Plate 54, figure 310)
- 20 Underside purple glazed, with dark purple-brown markings.
- 21 (22) Underside hindwing post-discal spot in space 6 with its outer edge convex. *A. bazalodes* (20.0 mm.)
- 22 Underside hindwing post-discal spot in space 6 with its outer edge concave. *A. bazalus* (22.0-23.0 mm.) (Plate 54, figure 311)

Key for the separation of the species of the *AGELASTUS* Group

- 1 (2) Underside forewing post-discal band oblique, decreasing from the costa and directed towards the tornus. Underside hindwing post-discal spots in spaces 6 and 7 very large and dark. *A. alaconia* (19.0 mm.) (Plate 54, figure 312)
- 2 Underside forewing post-discal band more or less parallel with the termen, not decreasing from the costa nor directed to the tornus. Underside hindwing post-discal spots normal.
- 3 (12) Underside forewing post-discal band evenly curved and not bent at vein 4. Underside hindwing post-discal spot in space 6 with outer edge convex (may be slightly angled or sinuous in the middle in *A. agelastus*).
- 4 (11) Underside ochreous brown. Underside forewing post-discal band not increasing in width below vein 5.
- 5 (6) Underside markings, and particularly the post-discal fasciae, comprising very regular and rounded spots. *A. cardoni* (16.0 mm.)
- 6 Underside post-discal fasciae, and particularly that on the forewing, comprising confluent bands.
- 7 (8) Forewing less than 16 mm. Both sexes upperside rather deep purplish blue, with rather uniform black distal borders (about 2 mm. at vein 4). *A. wildeyana* (15.0 mm.)
- 8 Forewing longer than 16 mm.
- 9 (10) Upperside purple in ♂, blue in ♀, forewing black border increasing markedly towards the apex in both sexes, and hindwing black border less than 2 mm. wide. *A. agelastus* (19.0-20.5 mm.)
- 10 ♂ upperside deep violet-purple, forewing black border narrow (1 mm.), and increasing slightly towards the apex. ♀ upperside deep blue, with broad black borders on both wings, and the hindwing border wider than 2 mm. *A. labuana* (21.5 mm.)
- 11 Underside pinkish grey. Underside forewing post-discal band increasing markedly in width below vein 5. *A. epimete* (15.0 mm.) (Plate 54, figure 317)
- 12 Underside forewing post-discal band bent at vein 4, and the spot in space 4 moved out of line with the spots in spaces 3 and 5. *A. arvina* (18.5-20.0 mm.)

Key for the separation of the species of the *ANISUS* Group

- 1 (8) Hindwing with the usual short tail at vein 2. Underside forewing post-discal band continued to vein 2 at least. Underside purple glazed.
- 2 (3) Underside forewing with the space between the post-discal band and the discal spots strongly whitened from the dorsum to vein 5 or 6. *A. parangansa* (14.0 mm.) (Plate 55, figure 319)
- 3 Underside forewing with the space between the post-discal band and the discal spots not whitened as above, although in individuals this space may be whitish from the dorsum to vein 4.
- 4 (7) Underside hindwing with the post-discal and central spots in space 7 separated by a white spot.
- 5 (6) ♂ upperside shining purple, with the forewing black border very narrow (less than 1 mm. wide). ♀ upperside bluish purple with the black borders comparatively narrow (less than 2 mm. on the hindwing). *A. ammen* (14.0 mm.)
- 6 Both sexes upperside blue with the black borders much broader, that on the hindwing 3 to 4 mm. wide. *A. ammonides* (13.0 mm.)

- 7 Underside hindwing with the post-discal and central spots in space 7 conjoined in their upper halves and not separated by a white spot. *A. ariel* (13.0 mm.)
- 8 Hindwing with the usual tail at vein 2, and a very short tail at vein 3. Underside forewing post-discal band usually only to vein 3, with a small spot against the outer border in space 2. Underside dark purple-brown, and no whitened areas. *A. abseus* (16.0 mm.)

Key for the separation of the species of the APIDANUS Group

- 1 (6) Underside hindwing post-discal spots in spaces 6 and 7 forming a dark bar coalesced with the dark spot at the end of the cell, and with their inner edges in line.
- 2 (5) Hindwing with a well developed tail at vein 2. Underside markings prominent.
- 3 (4) Underside hindwing with a large, dark, bifid, costal spot, not reaching the dark basal area. *A. diardi* (20.5 mm.)
- 4 Underside hindwing with the dark spot at the mid-costa continued as a dark band across the cell to the base of the dorsum. *A. fulgida* (19.0 mm.)
- 5 Hindwing tailless. Underside markings obscure. *A. amniella* (18.5 19.5 mm.)
- 6 Underside hindwing post-discal spots in spaces 6 and 7 and the spot at the end of the cell distinguishable as irregular separated spots.
- 7 (8) Hindwing tailed and lobed. Underside hindwing basal area broadly dark purple-brown and unmarked. *A. apidanus* (20.0 mm.)
- 8 Hindwing tailless.
- 9 (10) Hindwing slightly crenulate. Underside hindwing basal area purple-brown, with the outer edge diffuse. *A. areste* (20.0 mm.) (Plate 55, figure 327)
- 10 Hindwing entire. Underside hindwing basal area deep black, with the outer edge regular and sharply defined. *A. morphina* (22.5 24.0 mm.)

Arhopala aedias agnis C. and R. Felder

Plate 45, figure 179 ♀; Plate 50, figure 264 ♀

The Large Metallic Oakblue

This butterfly is one of the largest of the Malayan *Arhopala* species, and is among the least uncommon. The wings above are shining bluish purple (duller purple in old specimens), unmarked in the male, but with broad black bordering in the female. The hair-brown underside has the arrangement of markings usual in the genus, the spots being narrowly outlined by pale buff lines. As in all species of the *aedias* group, on the underside of the forewing the cell-spots are confined to the cell, and there is no well-defined dark area under the cell; on the hindwing the post-discal spots in spaces 5, 6 and 7 are in line, and there is a short tail at vein 2.

A curious feature about *A. aedias* is the occurrence of smaller individuals which appear to be identical with the normal form except in size; it is possible that two species are present. The Langkawi subspecies *meritalas* Corbet pertains to the larger form, and has the upper-side paler and brighter blue than in the Malaysian races.

A. aedias occurs from Burma to Malaysia and the Philippines, and is found in lowland forest, as is usual throughout the genus.

In the larger *A. hellada ozana* Fruhstorfer (plate 49, figure 263 ♀), the hindwing is more elongate, and there is a dark patch under the cell on the forewing beneath. Although a specimen was taken in Malaya by Pinwill before 1877, the specific status of *A. hellada* was not recognised until forty years later. The species is confined to Neomalaya.

Two species of the *antheus* group that should be mentioned here are

A. ijauensis ijauensis Bethune-Baker (plate 49, figure 255 ♀) and *A. anthelus grahami* Corbet (plate 49, figure 256 ♂). In this group the forewing cell-spots are continued in the spaces above, there is a well-defined dark area under the cell, and the post-discal spots in spaces 5, 6 and 7 on the hindwing are in line. *A. anthelus* has the upperside brilliant shining blue; the underside has the usual markings, but the spots on the forewing and in the costal half of the hindwing are coloured a deep purple-brown. The species is distributed from south Burma to Malaysia and the Philippines. *A. ijauensis* is of smaller size, and has the upperside a somewhat pale silvery blue; the rather variegated underside is distinctive in the white streak running from the base of the dorsum to the apex on the hindwing. The species is confined to Tenasserim and Malaya, and, while it is quite common on the plains in Kedawi, it is a rare montane butterfly in Malaya proper.

***Arhopala atosia malayana* Bethune-Baker**

Plate 45, figure 180 ♂; Plate 50 figure 265 ♂

The Tailed Disc Oakblue

This is another member of the *aedias* group, smaller than *A. aedias* but bluer above, and the male remarkable for the oval discal patch of specialised scales on the upperside of the forewing. In the male the forewing black border is a thread, and the female has comparatively narrow black borders. *A. atosia* can be differentiated from any near allies in that the post-discal spot in space 4 on the forewing is not in line with the spots in spaces 3 and 5, and the hindwing post-discal band is dislocated at vein 2. *A. atosia* is not uncommon in the Malayan lowlands, and usually, a number may be taken when and where it occurs. A bluer race, *jahara* Corbet is found in the Langkawi Islands. The species is distributed from south Burma to Neomalaya, Paramalaya and Palawan.

A. pseudomuta pseudomuta (Staudinger) (plate 50, figure 266 ♂) is of the same size as *A. atosia*, but the upperside is dull purple-blue or purple, the female is more heavily black bordered, and, on the forewing beneath, the post-discal spot in space 4 is in line with its neighbours. It is a rare species apparently confined to Malaya and Sumatra.

Although, according to our scheme of classification, *A. epimuta epiala* Corbet (plate 50, figure 269 ♂) belongs to a different group, it differs from *A. atosia* only in the absence of a tail on the hindwing. The possibility that the two are conspecific cannot be dismissed entirely, and field observations on the subject would be very welcome. *A. epimuta* is known only from south Burma, Malaya and Borneo; it has not yet been found in the Langkawi Islands, although the subspecies *elsiei* (Evans) is found in north Kedah.

A. moolaiana yajuna Corbet (plate 51, figure 277 ♂) bears a general

resemblance to *A. epimuta*, but the forewing is more quadrate, the upper-side is bluer and more lustrous, and the post-discal band on the underside of the forewing is very regular.

Arhopala moorei busa Corbet

Plate 50, figure 272 ♂, 273 ♀

Moore's Oakblue

A. moorei may be taken as representative of a section of the tailless *epimuta* group in which the species are often similar and difficult to separate. The underside is hair-brown as usual, and the markings may be difficult to trace. In this section the post-discal band on the hindwing is completely broken at vein 2.

The male of *A. moorei* is shining purple-blue, with a comparatively narrow uniform black distal border on each wing; the female is duller and more purple, and the black border increases towards the apex. The species is confined to Neomalaya, and favours lowland forest; when and where it occurs it is not uncommon.

A. muta maranda Corbet (plate 50, figure 271 ♀) is similar to *A. moorei* both above and below, but in the male the hindwing is paler blue than the forewing, and the female has the wing bases paler and bluer. *A. muta* is distributed from south Burma to Malaysia. In both *A. moorei* and *A. muta*, the post-discal spot in space 2 on the forewing beneath is not in line with the spot in space 3, as it is in the following two species.

In *A. metamuta metamuta* (Hewitson) (plate 50, figure 270 ♀) the male has the forewing violet-blue and the hindwing blue (greenish in a side-light), while the female resembles that sex of *A. muta*, but has broader black bordering. The male of *A. hypomuta hypomuta* (Hewitson) (plate 50, figure 268 ♂) is deep shining purplish blue, with the forewing border a thread; the female is rather dull blue, with broader black bordering than in allied species. In this species, the underside markings are neater and more macular than in allied forms. Both *A. metamuta* and *A. hypomuta* are essentially Neomalayan in distribution, although the latter species extends to south Burma.

Of the remaining species of the *epimuta* group, there are two of the size of *A. epimuta* that are fairly common. In both, the underside markings are rather indistinct, as is usual in the group, and the hindwing post-discal band is partially dislocated at vein 2. In *A. agesilaus major* (Staudinger) (plate 51, figure 278 ♂), the forewing post-discal band is dislocated at vein 4 so that the band is practically divided into two oblique portions, while in *A. amphimuta amphimuta* (C. and R. Felder) (plate 51, figure 279 ♂) this band is much more regular. The male of *A. agesilaus* is purple with a comparatively broad uniform black border on both wings; the same sex of *A. amphimuta* is violet-purple, with very narrow black bordering. Both species range from south Burma to Neomalaya

(*A. agesilaus* is found also in Palawan), and both have paler and brighter subspecies in the Langkawi Islands.

***Arhopala rafflesii rafflesii* Nicéville**

Plate 52, figure 288 ♂

Raffles' Oakblue

In the *democritus* group, of which *A. rafflesii* is a typical representative, the post-discal band on the forewing beneath is broken at vein 4, and the spot in space 4 is moved towards the termen, the hindwing post-discal spot in space 6 is moved in more or less directly below the spot in space 7, and the post-discal band is completely broken at vein 2.

In *A. rafflesii* the underside markings are edged with dull yellowish white lines, and are hardly darker than the ground colour; the male has the upperside deep shining blue, with the forewing black border a thread, and the duller and more purple female has the usual broader black borders. *A. rafflesii* is not uncommon in lowland forest, and is distributed from Burma to Malaya and Borneo.

A. democritus lycaenaria (C. and R. Felder) (plate 51, figure 284 ♂) is one of the commonest members of the *democritus* group in Malaya, and is easily recognised by the rather broad underside markings, which are mostly indicated by separated lines and streaks. In the nominotypical race from south Burma and Kedawi, the markings are silvery white, and are much more prominent than in the Neomalayan races, including *lycaenaria* from Malaya proper, where they are dull yellowish white as usual in the group.

The distribution of *A. alitaeus* is curious: the species is common in Tenasserim, and it occurs in the Langkawi Islands as *A. alitaeus valika* Corbet, which has a pronounced purplish glaze on the underside in the male*. On Singapore Island (subspecies *pardenas* Corbet) (plate 51, figure 285 ♂), and in Sumatra and Borneo, where the species is rare, the under surface is dull hair brown: the underside is pale buff with crimson brown markings in the Philippines and Celebes, where the butterfly appears to be rather common.

All the other Malayan species of the *democritus* group are rare, and individual specimens may be difficult to identify. Only the female sex is known of the large and beautiful *A. anella* Nicéville (plate 52, figure 289 ♀), which appears to occur at an elevation of about 1000 ft. in the mountains in Malaya and Sumatra.

***Arhopala zambra zambra* Swinhoe**

Plate 52, figure 291 ♂

The Singapore Oakblue

The species in the groups now under consideration have the forewing post-discal band more or less regular, and not much dislocated at vein 4,

* See Appendix, p. 496.

and, on the hindwing, the post-discal spots in spaces 6 and 7 are conjoined and not in line with the spot in space 5, and the post-discal band is completely dislocated at vein 2. The division between the *silhetensis* and *agaba* groups is entirely on size, the former comprising species with a forewing length of 21 mm. and above.

The Malayan species of the *silhetensis* group are so similar that the certain identification of an individual specimen may be impossible. The commonest species is *A. zambra*, which is widely distributed in lowland forest throughout the Peninsula, and occurs from Burma to Malaysia. On the upperside, the male is a shining deep blue, with a narrow black border on the forewing, while the female is duller, and more purple, and has rather broad black borders on both wings.

A. silhetensis adorea Nicéville (plate 52, figure 290 ♂) is larger than *A. zambra*, and the species is distributed from Assam and Burma to Malaysia and the Philippines. In Assam and Burma, and in Java and the Philippines, in fact in those countries where dry and wet seasons alternate, *A. silhetensis* has the forewing apex more pointed, and the underside markings strongly contrasted, so that *A. silhetensis* and *A. zambra* can be separated without difficulty when they fly together in such areas. In Neomalaya *A. silhetensis* has a blunter forewing apex, and a more uniform underside, and may be indistinguishable from *A. zambra*.

A. apha aphadantas Corbet (plate 52, figure 292 ♂) can be separated only with difficulty from the other members of the *silhetensis* group in Neomalaya, although the purple-washed underside, and the more regular and uniform post-discal band on the forewing, characterise this species in Tenasserim, Java and Lombok.

Arhopala agrata agrata Nicéville

Plate 52, figure 294 ♂

de Nicéville's Dull Oakblue

The characters which differentiate the species of the *agaba* group are given under *A. zambra zambra* Swinhoe. As the distinction between the *agaba* and *silhetensis* groups is only one of size, care must be taken that small specimens of *A. zambra* and *A. apha* are not misidentified.

A. agrata is moderately common in lowland forest in Malaya, and is distributed from Assam and Burma to Neomalaya. The male is deep violet blue, with the forewing black border a thread; the female is bluish purple, with the usual black bordering. The underside markings are narrow, rather dull and obscure; the forewing post-discal band is dislocated at vein 4, and the band is separated into two oblique and overlapping portions.

In another species of the group, *A. ace ace* Nicéville (plate 52, figure 293 ♂), which is about the same size as *A. agrata*, the underside bands are

remarkably broad and confluent, and hardly darker than the ground colour. On the upperside, the male is a deep cobalt blue, without any purple tinge. The species is very rare, and is known only from Assam, Malaya and Sumatra.

A butterfly common in Singapore Island, but rare elsewhere, is *A. kounga ridleyi* Corbet (plate 52, figure 295 ♂). In this species, the male has the upperside clear silky blue, with a very narrow black border on the forewing; the female is bluish purple, with rather uniform black bordering on both wings. On the ochreous brown underside the markings are distinct and rather confluent and the forewing post-discal spot in space 3 is moved inwards, and is out of line with the spots in spaces 2 and 4. Distributed from south Burma to Neomalaya and Paramalaya, with a larger and rather distinctive subspecies *milleri* Corbet in the Langkawi Islands, in which the spot in space 3 on the forewing is not so conspicuously moved out of line.

In two closely allied species, the forewing apex and termen are more rounded, and the post-discal band on the forewing beneath is more regular. In *A. aroa arops* Corbet (see plate 52, figure 296 ♂), the male is deep bluish purple, with perceptible black distal borders, and the apex blackened on the forewing. In *A. phaenops phanda* Corbet the male is a deep, shining blue, with the forewing black border a thread. The females are not easy to distinguish from those of *A. kounga*, but usually the black bordering is narrowest in *A. aroa*. *A. aroa* ranges from south Burma to Malaysia, while *A. phaenops* is distributed from south Burma through Neomalaya to the Philippines.

***Arhopala antimuta antimuta* C. and R. Felder**

Plate 52, figure 299 ♂

The Small Tailless Oakblue

This is a comparatively small butterfly, with a forewing length of about 15 mm. although, occasionally, larger specimens are found. The upperside is deep violet-blue in the male, with the forewing black border a thread, while the female is shining blue, with a slight purple tinge, and moderately broad black borders. On the hair-brown underside the markings are rather faint, and slightly darker than the ground; the forewing post-discal band is partly dislocated at vein 4, and, on the hindwing, the post-discal spot in space 6 is moved inwards and out of line with its neighbours, and the band is completely dislocated at vein 2. The hindwing is tailless.

A. antimuta is confined to south Burma and Neomalaya, and is not rare in lowland forest in the Peninsula.

In the larger *A. inornata inornata* (C. and R. Felder) (plate 52, figure 298 ♂), the underside markings are very confluent, but they are obscure, and are hardly darker than the ground. On the upperside, the male

is purplish blue, with the black border almost obsolete, while the female is a beautiful shining purplish blue with narrow black borders, that on the forewing increasing at the apex where it is inwardly diffuse. The species is confined to Neomalaya.

***Arhopala centaurus nakula* (C. and R. Felder)**

Plate 53, figure 302 ♂

The Centaur Oakblue

A. centaurus is one of the largest species of the genus, and gives its name to one of the largest of the Malayan groups. This comprises species with the hindwing tailed, the hindwing post-discal spots in spaces 5, 6 and 7 with their centres not in line, and the post-discal band not completely dislocated at vein 2.

A. centaurus can be recognised immediately by the silvery green lines edging the markings in the cell on the forewing beneath. In both sexes the forewing apex is more pointed than usual; the male is purplish blue, with the forewing black border a thread, and the paler and more purple female has moderately broad black borders, that on the forewing being more intensely blackened over the distal half of the cell.

The green larva is clothed with rather short hair, there is a brown saddle mark on the dorsum, and, laterally, there are brownish markings and a blackish line. The larva has been found on *Terminalia paniculata*, and other species of Combretaceae and on species of Lythraceae, and is attended by the Kerengga ant, *Oecophylla smaragdina*.

The butterfly is fairly common in lowland forest throughout Malaya, and abroad it is distributed from Ceylon and India through the Malay Archipelago to New Guinea and Australia.

A. vihara vihara (C. and R. Felder) (plate 53, figure 307 ♂) is a large species only a little smaller than *A. centaurus*, and it differs from all other species in the *centaurus* group in the separate and rounded post-discal spot in space 6 on the underside of the hindwing. The position of this spot is such that the butterfly may be mistaken for a member of the *atosia* group. The upperside is violet-blue, in the male, with a very narrow distal border on the forewing, while the purple female has the usual rather broad bordering.

A. barami penanga Corbet (plate 53, figure 301 ♂) is rather similar to *A. vihara* in size and underside pattern, but differs in the smooth and regular post-discal band on the forewing, which is not dislocated at vein 4 as in *A. vihara*, and the post-discal spot in space 6 on the hindwing is quadrate as usual. In both sexes the upper-side is shining purple or purplish blue, with a black costal border on the forewing, and the black distal borders decreasing slightly towards the tornus on both wings. Both *A. vihara* and *A. barami* are distributed from south Burma to Neomalaya.

Another species of about the same size is *A. corinda aceses* Nicéville (plate 53, figure 304 ♂), which is easily recognised by the very prominent dark purple-brown patch on the underside of the forewing below the cell. On the upperside the male is very deep violet, and the female is bright purple with black borders and black spots at the cell-ends. The species is found in south Burma, Malaya (including the Langkawi Islands, where it is represented by subspecies *corestes* Corbet), and the Philippine Islands.

***Arhopala eumolpus maxwelli* (Distant)**

Plate 45, figure 181 ♂; Plate 54, figure 308 ♀

The Green Oakblue

This is one of three or four species in the *centaurus* group in which the upperside of the male is shining green, while the female is purple with the usual black bordering.

A. eumolpus is of moderately large size (forewing about 21 to 22 mm.), and, on the brassy green upperside, the male has a comparatively narrow black border on the forewing, and a broad black border on the hindwing. The butterfly is rather common in lowland forest throughout the Peninsula, and it is distributed abroad from north India to Malaysia.

A. horsfieldi basiviridis Nicéville (plate 54, figure 309 ♀) is quite similar to *A. eumolpus*, but the male has very broad black borders on the upperside of both wings. The female is purple, with only moderately broad black borders, and is usually larger, and with a darker underside, than in *A. eumolpus*. Nevertheless, the two are difficult to separate, and, indeed, identification of individual females is not always possible. In neither sex do the genitalia of the two species differ. *A. horsfieldi* has a rather more restricted range than *A. eumolpus*, not occurring north of Tenasserim, and the Burmese race *eurysthenes* Fruhstorfer is found as far south as the Langkawi Islands.

A. aurea (Hewitson) (plate 53, figure 305 ♀) and *A. trogon* (Distant) (plate 53, figure 306 ♂) are smaller than the foregoing species, and whether they are distinct specific entities is still a matter of doubt. The male is bronzy green, with light blue basal scaling. In *trogon* the forewing black border is a thread, but in *aurea* it widens towards the tornus; the hindwing black border almost reaches the end of the cell in *aurea*, but is narrower in *trogon*. On the underside, in both sexes, the post-discal spot in space 2 on the forewing is moved out towards the termen; the ground colour is hair-brown in *aurea* and purple brown in *trogon*. Eliot has taken a peculiar form in Johore, which has the underside purple brown as in *trogon*, whilst the upperside has more extensive black markings even than *aurea* and is devoid of basal blue scaling. These butterflies are confined to Neomalaya, and are not uncommon

in lowland forest in Malaya, where females are taken more frequently than males.

***Arhopala wildeyana wildeyana* Corbet**

Plate 54, figure 314 ♂

Wildey's Oakblue

This species may be taken as representative of the *agelastus* group, which differs from the *centaurus* group only in the absence of a hindwing tail. All members of the *agelastus* group are scarce in the Peninsula, but *A. wildeyana* is not rare on Singapore Island, where it was recently discovered by Wildey. The butterfly is rather small in size (forewing about 15 mm.) ; the male is deep shining blue, with the comparatively broad black distal border decreasing towards the tornus on each wing, and the female is deeper blue, with the bordering slightly broader. On the ochreous brown underside the markings are darker than the ground, rather broadly edged with ochreous buff, and the post-discal bands are confluent. The species occurs also in the Langkawi Islands (subspecies *havea* Corbet) and in Borneo.

A. cardoni Corbet (plate 54, figure 313 ♂) is slightly larger than *A. wildeyana*, and resembles that species on the upperside in the male, and the underside markings are very macular and regular. The butterfly is known only from a single Perak male.

*A. arvina adalita*s Corbet (plate 54, figure 318 ♂) is a montane butterfly of larger size (forewing about 19 to 20 mm.), characterised by the greyish brown, slightly glazed, underside, on which the confluent markings are darker than the ground, and somewhat rectangular in shape ; the post-discal band on the forewing is sharply angled at vein 4. The species seems to be rare throughout its range, which extends from Assam and Burma to Malaya and Java. The male is deep purple with the black border a thread, while the female is shining bluish purple, with narrow black borders, and a large black costal patch beyond the cell-end on the forewing.

In two further species in the group, which are slightly larger than *A. arvina*, the underside is ochreous brown, and the forewing post-discal band is broad, regular and confluent. In *A. agelastus agelastus* (Hewitson) (plate 54, figure 315 ♂) the upperside is purple in the male, and shining blue in the female, and, in both sexes, there is a black apical border on each wing. In the very rare *A. labuana labuana* B  thune-Baker (plate 54, figure 316 ♂), the male is deep shining purple with a very narrow black border on the forewing, and the female is deep blue, with broad black borders on both wings. The first-named species is distributed from Tenasserim to Indo-China and Malaya, while *A. labuana* is found in south Burma, Siam, Neomalaya and Paramalaya.

Arhopala abseus abseus* (Hewitson)Plate 55, figure 323 ♂***The Aberrant Bushblue**

The *abseus* group comprises a few rather small species of *Arhopala*, all of which are rare except *A. abseus*. In this group the post-discal spots in spaces 5, 6 and 7 on the hindwing beneath are not in line, and, on the underside of the forewing, there is a costal spot at the base of space 11, as well as other spots above the cell.

A. abseus is widely distributed, ranging from Ceylon and India to Neomalaya and the Philippines. It can be readily recognised by the second very short hindwing tail at vein 3, as well as the usual tail at vein 2. Above, the male is deep lustrous violet-blue, with a rather uniform black distal border on each wing, while the female is shining purple-blue, with slightly broader black borders, that on the forewing being continued along the costal margin.

The butterfly frequents lowland forest in Malaya ; it is not rare, and occurs not uncommonly on Singapore Island.

In a difficult complex comprising *A. ammon* (Hewitson) (plate 55, figure 320 ♂) *A. ammonides chunsu* Fruhstorfer (plate 55, figure 321 ♂) and *A. ariel antis* Corbet (plate 55, figure 322 ♂), the underside is purple-brown, with the rather large spots only slightly darker than the ground ; the space between the post-discal and central spots in space 7 on the hindwing is whitened, but almost imperceptibly so in *A. ariel*. The upperside is blue, or purple-blue, with rather broad black distal borders (but rather less than 1 mm. in *ammon*), and the sexes may be difficult to separate. The *ammon* complex occurs from Assam and Burma to Malaysia.

Arhopala apidanus kartaphilus* FruhstorferPlate 55, figure 326 ♂***The Plain Bushblue**

The *apidanus* group of *Arhopala* is characterised by the aberrant pattern on the underside, that on the forewing comprising broad dark bands running from the costal margin to space 2 or 1b. The species are of moderately large size, although *A. anniella* is smaller.

The commonest and most widely distributed member of the group is *A. apidanus*, which flies from Assam and Burma to Malaysia, the Philippines and Celebes. Above, the male is deep purple, with narrow black borders, and the female is shining purplish blue, with uniform black bordering on the costal and distal margins of both wings. The underside is purple-brown, with darker markings, and the basal third of the hindwing is entirely darkened ; particularly in fresh specimens, there is a small deep red patch at the base of the costa on both wings. The hindwing is tailed at vein 2 and toothed at veins 1b and 3.

The larva feeds on *Lagerstroemia*, *Eugenia jambolana*, *E. polyecephale* and *E. jambos* and, at least when young, is gregarious. It is green, with a darker dorsal line, and with a black dorsal patch on the first and last segments. Sometimes the pupa is parasitised by Tachinids (figs. 92 and 93).

Two similar species of about the same size are *A. diardi almansor* Fruhstorfer (plate 55, figure 324 ♂) and *A. fulgida singhapura* (Distant), but these differ from *A. apidanus* in that the underside of the hindwing is not broadly darkened basally. Both species have a well-developed tail at vein 2 on the hindwing, and are slightly toothed at veins 1b and 3. On the upperside the male is rather dull purple, while the female is bluish purple with black bordering much as in *A. apidanus*, although that in *A. diardi* is narrower. On the underside of the hindwing the spot in the middle of space 7 is separated from the spbt in the cell in *A. diardi*, but in *A. fulgida*, this spot is continued as a broad band across the cell. Both species are distributed from Assam and Burma to Malaysia, and *A. diardi* occurs also in Celebes.

In the smaller *A. anniella anniella* (Hewitson) (plate 55, figure 325 ♂), the hindwing is tailless, although slightly toothed at veins 2 and 3. The male is deep lustrous purple-blue, with comparatively narrow black borders. The underside is almost entirely dark purple-brown, with very obscure markings. The butterfly is not rare in primary forest at the usual elevations, and flies from south Burma to Malaysia.

The largest and most beautiful member of the *apidanus* group is the tailless *A. morphina morphina* (Distant) (plate 55, figure 328 ♂), which is easily recognised by the very dark blackish brown basal area on the hindwing beneath, which contrasts sharply with the rosy buff area beyond. Above, the male is a beautiful lustrous blue, and the female is shining purplish blue, with a rosy hue in some lights, and with quite narrow black bordering on both wings. The male was quite common on Bukit Kutu, Selangor, on the occasion of visits in March, 1928, and April, 1931. The species is confined to Neomalaya, and appears to be montane in habit.

A. fulla intaca Corbet (plate 55, figure 329 ♂) is very rare in Malaya, although widely distributed from Sikkim to Burma, Malaysia and the Moluccas. It is the only species of the group in Malaya and is remarkable in that the buff brown underside is almost unmarked, except for the rather obscure dark post-discal and submarginal fasciae on both wings. The forewing measures 18–20 mm.

Genus *Surendra* Moore

The butterflies have the same habits as *Arhopala*, but they are easily separated from species of that genus by the simple pattern on the underside.

Distributed from Ceylon and India through Malaysia to Celebes.

Key for the separation of the species of SURENDRA

- 1 (4) Underside hair brown ; the forewing with a cell-end stripe and a spot in the middle of the cell.
- 2 (3) Hindwing with a short tail at vein 2, and a tooth at vein 3, both longer in the female.
- 3 Hindwing not tailed, but with a short tooth at vein 3.
- 4 Underside pale ochreous brown, with a faint purple gloss ; the forewing without a spot in the cell or at the cell-end.

*S. vivarna**S. florimel**S. todara****Surendra vivarna amisena* (Hewitson)**

Plate 45, figure 182 ♂

The Acacia Blue

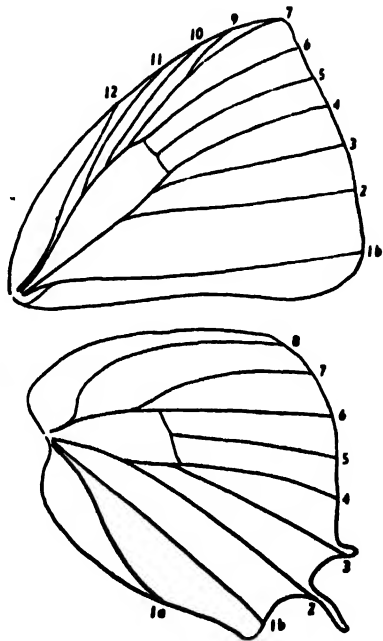
In the male, the wings above are deep shining purplish blue, with a black apical border on the forewing, and on the hindwing both the costal and inner margins are broadly black bordered. The female is steely blue, with narrow diffuse black borders on both wings. The underside is hair brown, with small and obscure dark spots in the middle and end of the forewing cell ; an irregular dark post-discal line on both wings is outwardly edged with white on the hindwing, each wing has a series of dark submarginal striae, and there is a dark rounded sub-marginal spot in space 6 on the hindwing.

The butterfly is rather uncommon ; it is taken singly in lowland forest, and is rarely found much above 2,500 feet. The male is much rarer than the female. The species is distributed from south Burma to Malaysia and Celebes.

S. florimel Doherty is essentially a Malaysian species, and favours somewhat higher elevations. Above, the male is much as in *S. vivarna*, and the female is deep purple brown. The underside is without the prominent dark submarginal spot in space 6 on the hindwing, and there is a dark brown band across this wing from the apex to the middle of the dorsum.

Genus *Semanga* Distant

In the elegant butterfly constituting this monotypical genus, the upperside is deep lustrous purple in the male, paler in the female, with a black border on the forewing, and an orange-red distal border on the hindwing. The buff brown underside has a narrow reddish brown

Fig. 125. *Surendra vivarna* ♂. Venation.

post-discal line on each wing, and the tornal area of the hindwing is red with black spots and metallic blue or green zigzagged lines. The male has a dark brand in the lower distal half of the cell on the forewing above (visible on application of benzene, etc.).

The single species is practically confined to Malaysia. The Malayan representative *S. superba deliciosa* Seitz is taken singly in heavy forest at all usual elevations.

Genus *Loxura* Horsfield

The white-tipped hindwing tail at vein 2 is about 10 mm. The female has the upperside more heavily dark-dusted.

The genus comprises two species, of which the more widely distributed *L. atymnus* ranges from Ceylon to Malaysia, the Philippines and Sumbawa.

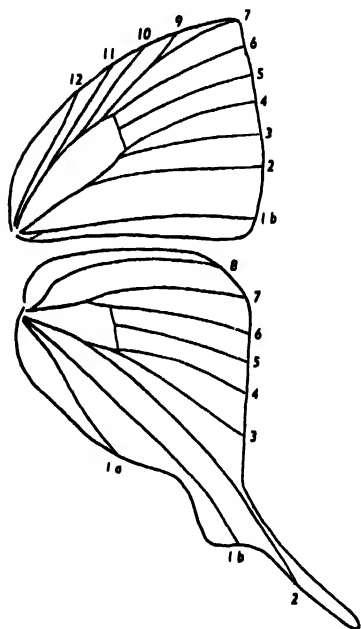


Fig. 126. *Loxura atymnus* ♂. Venation.

Key for the separation of the species of *LOXURA*

- 1 (2) Underside forewing post-discal band regular and not dislocated at vein 4. Upperside forewing with the costal area above the cell usually not conspicuously blackened. *L. atymnus*
- 2 Underside forewing post-discal band dislocated at vein 4. Upperside forewing with the costal area above the cell blackened. *L. cassiopeia*

Loxura atymnus fuconius Fruhstorfer

Plate 45, figure 183 ♂

The Yamfly

The upperside is reddish orange, with a neat black apical border on the forewing; on the yellowish buff underside a somewhat obscure post-discal fascia can be distinguished. In the female, the tornal area of the hindwing is dark dusted.

The dark green woodlouse-shaped larva feeds on the young shoots of the yam (*Dioscorea*). The butterfly is not uncommon in waste land, open forest, and even in the neighbourhood of villages, but it does not ascend the hills, and is usually found only below 1,000 feet. It flies rather high, and is by no means an inconspicuous insect. The species is widely distributed, ranging from Ceylon and India to the Lesser Sunda Islands.

L. cassiopeia cassiopeia Distant is a forest insect, and found as high as 2,500 feet. The species is confined to Neomalaya, and, in collections, it is often confused with *L. atymnus*. The two species differ distinctly,

however ; *L. cassiopeia* is larger, with the upperside redder, the forewing black border broader and continued along the costa, and the wing bases more heavily dark dusted. The female is darker than in that sex of *L. atymnus*.

Genus *Yasoda* Doherty

In general appearance the single species in the genus resembles *Loxura*, but, structurally, the two genera are not very closely allied. The white-tipped hindwing tail at vein 2 in *Yasoda* is 8 or 9 mm. in length. The male has a broad, black brand along the distal two-thirds of vein 1b on the upperside of the hindwing.

Y. pita is distributed from Sikkim to Indo-China and Malaysia.

Yasoda pita dohertyi Fruhstorfer

Plate 45, figure 184 ♀

The Branded Yamfly

The wings above are dull orange-red, with black borders extending from near the mid costa to the tornus on both wings. The underside is ochreous, with obscure markings, and the post-discal fascia is nearer the wing margins than usual. On the hindwing above, the female has a black band beyond the cell.

Y. pita is not uncommon along forest paths at elevations above 2,500 feet, but is much rarer at lower elevations. Its habits resemble those of *Loxura*, and nothing is known regarding the early stages.

Genus *Drina* Nicéville

As at present constituted, the genus *Drina* does not comprise a very homogeneous group, *D. manea* being considerably different from the other members. Both *D. donina usira* (C. and R. Felder) and *D. cowani* Corbet are dark brown above, with white markings, and the silvery white underside has obscure post-discal and submarginal lines. In the first-named, there is a double series of white spots in the distal area of the hindwing above, while, in *D. cowani*, this wing surface has a whitish suffusion (with some faint markings) in the tornal areas, and white post-discal spots in spaces 6 and 7.

D. donina occurs in south Burma and Indo-China, and is not found south of Malaya. *D. cowani* is known to me only from a Bornean female and a Malayan male*. In these two species the sexes are alike. Other species allied to *D. donina* are found in west China and the Philippine Islands.

In *D. manea* (Hewitson) the matt white underside has a broad ferruginous brown distal margin on each wing, and the tornal area of the hindwing is marked with a broad black irregular stripe. The dark brown upperside has the whitened tornal area of the hindwing marked with a black stripe as below, and, in the male, the inner two-thirds of

* See Appendix, p. 496.

the forewing is bright blue, with the veins in this area covered with buff brown specialised scales. This scaling of the veins is remarkable in that two features are shown which are otherwise present only in one or two primitive families of moths.

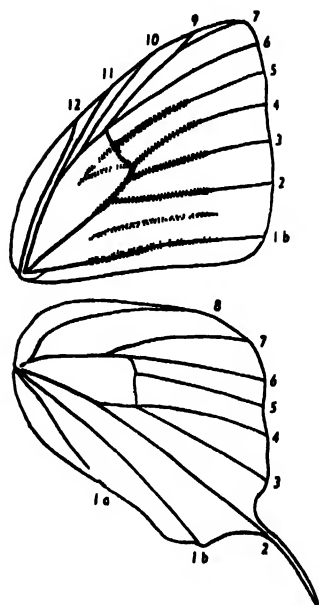


Fig. 127. *Drina manea* ♂. Venation.

Veins 4 and 5 (M_3 and M_2 in the Comstock notation), are produced back into the cell where they unite to form the median, and vein 1c (not shown in the figure) is also faintly present. These characters were undoubtedly present in the ancestral forms of Lepidoptera, but the veins mentioned are found to-day only in the Micropterygidae and allied groups, which are sometimes separated from the rest of the Lepidoptera as the order Zeugloptera.

D. manea occurs from Mergui in south Burma to Neomalaya, and is rare throughout its range. In Malaya, it appears to be confined to lowland forest. ♂ genitalia, Plate 14, fig. 214.

Key for the separation of the species of *DRINA*

- 1 (2) Underside matt white, with broad ferruginous brown distal borders. *D. manea*
- 2 Underside silvery white, without dark borders.
- 3 (4) Upperside hindwing dark brown, with two series of white discal spots *D. donina*
- 4 Upperside hindwing dark brown, with a white tornal patch, with obscure markings, and with white post-discal spots in spaces 6 and 7. *D. cowani*

Genus *Spindasis* Wallengren

The genus occurs in Africa, and is distributed from India to China, Japan, Malaysia and the Philippines, but in the Oriental Region its headquarters are in the Himalayas.

The butterflies are quite distinctive. The upperside is dark brown (deep blue shot in the male), and the transverse silvery lines on the pale yellow underside are bordered with black or red.

(Basic literature; Corbet, 1940g.)

Key for the separation of the species of *SPINDASIS*

- 1 (2) Underside forewing basal streak clavate. Underside silvery transverse lines edged with black; hindwing subbasal band terminates on vein 1b, and is not continued along it. *S. syama*
- 2 Underside forewing basal streak L-shaped. Underside silvery transverse lines edged with red (but black overlaid with reddish in *S. lohita milleri*); hindwing subbasal band continued along vein 1b to, or nearly to, the tornal end of the central band. *S. lohita*

Spindasis lohita senama* (Fruhstorfer)Plate 45, figure 185 ♀; genitalia, Plate 14, figure 215***The Long-banded Silverline**

The male has the dorsal area of the forewing and almost the whole of the hindwing shot with deep purple-blue ; otherwise, in both sexes, the wings are dark brown, with the orange tornal area of the hindwing spotted with black. The pale yellow underside is traversed by five or six silvery lines which are prominently edged with red. In the Langkawi subspecies, *milleri* Corbet, the silvery lines are edged with black overlaid with reddish scales.

S. syama terana (Fruhstorfer) resembles *S. lohita*, but the silvery stripes on the under surface are outlined with black. In separating the two species, the shape of the basal streak is an infallible guide ; the colour of the edging to the silver bands is of little importance.

Both species occur throughout India, China, Formosa and Malaysia, but *S. lohita* extends to Ceylon and *S. syama* reaches the Philippines. In Malaya, the butterflies mostly frequent lowland forest, and are usually found settled on shrubs and bushes with closed, or partially closed, wings. *S. syama* is the rarer of the two in the Peninsula.

The larva of *S. lohita* has been described as dark green or brown, mottled with lighter shades, and the food plants include *Dioscorea*, *Xylia* and *Psidium guajava* (guava). According to observations by C. J. Brooks in Borneo, the larva constructs a shelter from fragments of bark or stem into which it is guided by the attendant ants when disturbed : pupation takes place in the same shelter.

Genus *Pratapa* Moore

The presence of two moderately long tails of equal length on the hindwing, combined with the blue upper surface of the wings, differentiates this genus from all others in the Theclinae.

Formerly, the genus was divided into two on account of the secondary sexual characters present in the males :—

(a) *Pratapa* Moore, in which the males have a prominent brand overlying an area of specialised scales around the origin of vein 7 on the hindwing above, and one (or occasionally two in *P. cleobis*) moderately long hair tuft in the dorsal area on the underside of the forewing. In the male of *P. vidura*, there is also a brand, overlaid with a long white hair tuft, in the middle of space 1b on the upperside of the forewing, and, in *P. ctesia*, the male has two large black rounded areas of specialised scales on the forewing above. The other species of *Pratapa* (*sensu stricto*), in addition to those mentioned above, are *P. blanka*, *P. deva*, *P. icetoides* and *P. icetas*.

(b) *Tajuria* Moore in which the males are without a brand on the hindwing above. That sex of *P. mantra*, *P. deudorix*, *P. dominus*,

P. buto, *P. stigmata* and *P. cleoboides* has, on the forewing above, a brand comprising an area of specialised scales in or beyond the cell. The male of *P. elioti* has the basal third of the forewing covered with fawn coloured specialised scales.

As the females in the two groups appear to be inseparable on structural grounds, it seems advisable to unite the two in the genus *Pratapa*. There may be some justification for maintaining *Dacalana* Moore (with type species *P. vidura*) as a distinct genus, as all twelve veins are present on the forewing in the male, although vein 8 may be absent in the female.

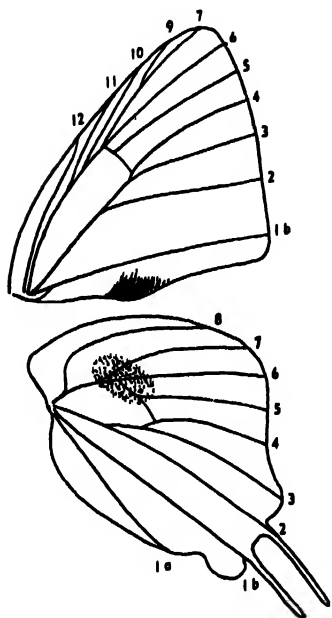


Fig. 128. *Pratapa deva* ♂. Venation.

In all species the male genitalia are quite distinct (plates 14 and 15, figs. 216–234), although those of *P. deva* and *P. icetoides* are somewhat similar. *P. dominus* is interesting in that its two subspecies *culta* Nicéville from Assam and Burma, and *dominus* (H. H. Druce) from Neomalaya, are hardly distinguishable on facies, although the male genitalia are quite different.

Several of the races of *P. vidura* are characterised by differences in the male genitalic pattern, but the most extreme case is that of *P. anysis* (Hewitson), which resembles *P. vidura* in wing pattern, but the male is without a brand and hair tuft on the upperside of the forewing. *P. anysis* is distributed from Sikkim through Malaysia to Celebes, although it has not yet been found in the Peninsula, and the races from Sikkim to Burma, Nias, Borneo, Java and Celebes all show remarkably distinct male genitalia.

The genus is represented throughout the Oriental Region.

(Basic literature: Corbet, 1938a, 1940e, 1940g.)

Key for the separation of the species of PRATAPA

- 1 (2) Underside with a clearly defined white median band, not inwardly shaded with ferruginous, and the hindwing black tornal spot in space 2 broadly orange-crowned.
P. vidura (14.0–16.0 mm.)
- 2 Underside not as above.
- 3 (8) Palpi third segment long and thin. Forewing veins 5 and 6 approximate at their origins.
- 4 (5) Underside deep ochreous, and no post-discal fascia. *P. donatana* (13.0–15.0 mm.)
- 5 Underside grey.
- 6 (7) Underside with a post-discal series of separated dark streaks, and bars at the cell-ends.
P. ctisia (16.0–17.5 mm.)
- 7 Underside with a dark narrow post-discal line which, on the forewing is faint in ♂, and obsolete in ♀; no cell-end bars.
P. blanka (14.0–17.5 mm.)

- 8 Palpi third segment short as usual. Forewing veins 5 and 6 parallel at their origins.
- 9 (10) Underside rather pale ferruginous brown, with a narrow white post-discal band, outwardly shaded with ferruginous, and the black tornal spot in space 2 on the hindwing very narrowly orange-crowned. *P. yajna* (14.0-15.5 mm.)
- 10 Underside not as above.
- 11 (16) Underside hindwing with a black spot in space 7 internal to the post-discal band. Underside white or greyish white.
- 12 (15) Underside with the usual post-discal bands, and bars at the cell-ends.
- 13 (14) Upperside forewing without a white discal patch, or at most a small obscure white patch in ♀. *P. lusculentus* (16.0-18.0 mm.)
- 14 Upperside forewing with a prominent white discal patch. *P. illurgoides* (21.0 mm.)
- 15 Underside abnormal, with large black spots, and no post-discal bands. *P. maculatus* (17.5-21.0 mm.)
- 16 Underside hindwing without a spot in space 7 internal to the post-discal band. Underside grey or pale brown.
- 17 (40) Forewing vein 9 present.
- 18 (35) Forewing vein 9 comparatively long, with its origin at, or before, the post-discal band.
- 19 (22) Underside post-discal band macular, comprising separated striac. Underside silvery grey in ♂, greyish white in ♀.
- 20 (21) ♂ underside forewing without a tuft. ♀ upperside hindwing with a post-discal series of black stripes. *P. cyphus* (17.5-21.5 mm.)
- 21 ♂ underside forewing with a black tuft. ♀ upperside hindwing no post-discal fascia. *P. deva* (13.5-16.5 mm.)
- 22 Underside post-discal band not macular, and comprising conjoined streaks.
- 23 (26) Underside forewing base of costa tinged with yellow.
- 24 (25) ♂ underside forewing with a yellow tuft. ♀ upperside with broad black borders. *P. icetoides* (12.5-14.5 mm.)
- 25 ♂ underside forewing without a tuft. ♀ forewing apex more pointed, termen straight, and the blue areas on the upperside of both wings much more extensive. *P. ister* (14.5-16.5 mm.)
- 26 Underside forewing base of costa not ochreous.
- 27 (32) Underside forewing post-discal band midway between the cell-end and the termen.
- 28 (31) Underside hindwing black tornal spots subequal, and the orange scaling broken, or almost broken, in space 1b.
- 29 (30) ♂ underside forewing with a black tuft. ♀ upperside hindwing black dusted, and with broad black borders. *P. icetas* (14.0-15.0 mm.)
- 30 ♂ underside forewing without a tuft. ♀ upperside hindwing blue. *P. jalajala* (17.0-19.0 mm.)
- 31 Underside hindwing black subternal spot in space 2 distinctly larger than that on the lobe, and the orange scaling broadly continuous from space 1a to space 2. *P. suna* (19.0 mm.)
- 32 Underside forewing post-discal band nearer the termen than the cell-end.
- 33 (34) ♂ upperside greenish blue. ♀ upperside forewing with the black apical border almost to the cell-end. *P. mantra* (16.5-20.0 mm.)
- 34 ♂ upperside clear blue. ♀ upperside forewing with the blue colour extending beyond the cell-end. *P. deudorix* (18.5-20.0 mm.)
- 35 Forewing vein 9 short, with its origin beyond the post-discal band.
- 36 (37) Underside hindwing black subternal spot in space 2 almost circular, and much larger than the spot on the lobe. *P. ixaes* (14.0-16.0 mm.)
- 37 Underside hindwing black tornal spots in space 2 and on the lobe subequal.
- 38 (39) Underside forewing post-discal band straight. ♂ underside forewing with a single black tuft, but a second, shorter, creamy white tuft may also be present; upperside forewing no brand. *P. cleobus* (14.0-18.0 mm.)
- 39 Underside forewing post-discal band curved, and more or less parallel to the termen. ♂ underside forewing without a tuft; upperside forewing with a black, oval brand in the distal half of the cell. *P. dominus* (13.0-15.0 mm.)
- 40 Forewing vein 9 absent.
- 41 (46) Underside hindwing black subternal spot in space 2 at least twice as broad as that on the lobe.
- 42 (45) Underside post-discal bands rich ochreous brown.
- 43 (44) Underside forewing post-discal band rather oblique, directed basad at its costal end, continuous to vein 1b; the lower half of space 1b not conspicuously whitened. ♂ upperside forewing basal third blue as usual. *P. bulo* (13.5-15.0 mm.)
- 44 Underside forewing post-discal band exactly parallel to the termen throughout its length and terminating in the middle of space 1b; the lower half of space 1b conspicuously whitened. ♂ upperside forewing basal third with a fawn coloured area of specialised scales. *P. elioti* (14.0-16.5 mm.)

- 45 Underside post-discal bands dark greyish brown. Underside forewing post-discal band nearer the cell-end than the termen. *P. stigmata* (14.0–17.5 mm.)
 46 Underside hindwing black tornal spots in space 2 and on the lobe subequal. *P. cleoboides* (11.0–13.0 mm.)

***Pratapa vidura sinhara* (Fruhstorfer)**

Plate 45, figure 186 ♂

The Double Tufted Royal

This butterfly is usually found singly in lowland forest, flying around bushes between 4 and 6 feet from the ground. The upperside is rather pale chalky blue (in the male with a hair tuft overlying a brand on the forewing, and a brand in the costal area of the hindwing), and the underside is brownish grey with a comparatively broad white discal stripe across both wings. Beyond the white stripe is a narrow dark brown post-discal line, which is more or less linear in *P. vidura sinhara*, but is broken into short curved streaks in the Kedawi subspecies *burmana* (Moore).

P. vidura flies throughout Malaysia and occurs as far north as Bhutan and Assam. Nothing is known regarding the early stages.

***Pratapa deva relata* Distant**

Plate 46, figure 187 ♂

The White Royal

In the male, the upperside is deep lustrous blue, with black borders on both wings, that on the forewing being very broad at the apex. The female is paler blue above, and the black border on the forewing is narrower than in the male. The under surface is greyish white, with a post-discal series of narrow dark streaks which are darker on the hindwing than on the forewing. The hindwing black tornal spot is orange-crowned.

The grey larva has the shape of a rather stout woodlouse and, in India, feeds on *Loranthus tomentosa*. The butterfly occurs from north India to Malaysia, and is rare in the Malaysian subregion. In Malaya it is found in primary and secondary forest at the usual elevations.

Except for the rather distinctive *P. ctesia ctesia* (Hewitson) the remaining Malayan species of the *deva* group have the upperside much as in *P. deva*. *P. ctesia* is an Indian species, which is not found south of the Peninsula, where it is restricted to altitudes above 3,500 feet. The underside is silvery grey, with cell-end bars, and dark post-discal spots. The male is easily recognised by the two large black brands on the forewing above.

P. blanka blanka (Nicéville) has the underside shining silvery white, duller in the female, with the post-discal line almost obsolete in the forewing. The very rare female has noticeably rounded wings. Another lowland species is *P. icetoides calculis* H. H. Druce, in which the underside

is greyish buff, with the narrow post-discal lines outwardly slightly whitened. Both *P. blanka* and *P. icetoides* are distributed from India to Malaysia. *P. icetas sakaia* Corbet is a rare montane species in Malaya, and can be separated from *P. icetoides*, which it closely resembles, in that the base of the costa on the forewing beneath is not tinged with yellow. *P. icetas* occurs as far north as Sikkim, but has not been found south of Malaya.

The male of *P. cleobis queda* Corbet has the upperside shining royal blue, with a slight greenish tinge, and with a broad black apical border covering more than half the forewing; the hindwing has no black bordering below vein 6. The female is a pale rather silvery blue with black bordering on the forewing. The underside is pale greyish brown, with a narrow reddish brown post-discal line which is outwardly very narrowly, and almost imperceptibly, edged with white. *P. cleobis* is not uncommon in India and Burma, but is a rare species confined to the mountains as far as Malaya is concerned. Usually, in this species, two hair tufts are present on the underside of the forewing in the male, a short creamy white tuft lying slightly distad from a long and conspicuous black tuft: in Malaya, usually only the black tuft is present, but a single male with both tufts present (δ -f. *pendleburyi* Corbet) was taken on Gunong Terbakar, Pahang, at 4,480 feet in May, 1939, by Pendlebury.

The larva of *P. cleobis* has been found in India on *Loranthus elasticus*, presumably on the blossoms.

Both sexes of *P. cleobis* can be separated from any superficially similar Malayan species of *Pratapa* by the very convex forewing termen in both sexes.

***Pratapa cippus maxentius* (Fruhstorfer)**

Plate 46, figures 188 and 189 ♀

The Peacock Royal

In the male, the upperside is a beautiful royal blue, with a broad black apical border on the forewing. The female is paler, and has a more dingy appearance, and the hindwing has a series of black post-discal striae and a marginal series of diffuse black spots. The underside is white (greyish white in the female), with a post-discal series of dark separated striae on both wings, and rather obscure submarginal and marginal fasciae; the large black tornal spots in spaces 1a and 2 on the hindwing are broadly orange-crowned.

The larva is ashy grey, with segments 2 to 5 much darker grey, and some lateral dark markings, and feeds on *Loranthus*.

The butterfly is not uncommon in lowland forest, and the sexes occur in about equal numbers. The butterflies are to be taken flying around flowering shrubs. The species appears to be more common in some other parts of its range, which extends from Ceylon and India to south China and Malaysia.

Two rather large species of about the same size as *P. cippus* are *P. mantra mantra* (C. & R. Felder), in which the male is distinctly greenish above, with a faint diffuse reddish brown brand at the cell-end on the forewing, and *P. deudorix ingeni* Corbet, in which the male is royal blue with the forewing brand only visible as a more heavily blackened area on the black apical border. Both species have the usual greyish brown under surface, with the usual narrow dark post-discal line on each wing.

Three smaller species with the upperside shining royal blue in the male, paler blue in the female, and with the usual greyish brown underside are *P. isaeus verna* (Corbet), in which the male has the cell-area slightly greenish, and in both sexes the black tornal spot in space 2 on the hindwing beneath is very large; *P. dominus dominus* (H. H. Druce), with the large black brand at the cell-end on the forewing almost isolated from the black apical border; and *P. buto cowani* (Corbet), in which the black brand is more obscure and conjoined with the black apical border.

The smallest species of the genus, *P. cleoboides viga* (Corbet), is easily recognised, in the male, by the pale brand almost covering the cell and extending to vein 2 on the forewing. Except the last-named all the aforementioned species in this section are distributed about Neomalaya and Malaysia, and all are confined to lowland forest. *P. buto*, however, appears to be restricted to Singapore Island as far as Malaya is concerned. A curious lowland form is *P. donatana donatana* (Nicéville), with the underside rich ochereous, and unmarked except for the black tornal spots on the hindwing, which are ornamented with metallic green scaling and edged with white stripes. The female is very rare.

Mention may also be made of three rare montane species which have recently been added to the Malayan list. *P. maculatus* (Hewitson) has the white underside marked with large rounded black spots, and, although not uncommon from Sikkim to Burma, it is very rare in the mountains of Neomalaya. *P. illurgioides taorana* (Corbet) and *P. luculentus nela* (Swinhoe) are rather large species, which are readily recognisable in that the white underside has a black spot at the base of space 7 on the hindwing. In the last two species, the tornal area on the hindwing beneath has the pattern and colouring much as in the representatives from Assam and Burma, and lacks the extensive orange areas characteristic of the true Malaysian species of *Pratapa*. There is, indeed, little difference between the Malayan forms of *P. illurgioides* and *P. luculentus* and their Indian races, and, as they extend to northern India and have not been found south of the Peninsula, it must be concluded that they are comparatively recent arrivals in Malaya from the north, and have become established after the separation of Sumatra from the present Peninsula.

Genus *Purlisa* Distant

The single species comprising this genus is one of the largest and most beautiful of the Theclinae. The forewing length is about 27 mm., and the species is confined to Neomalaya, where it is always rare. In Malaya, it appears to be largely restricted to the mountains.

P. giganteus giganteus (Distant) suggests a large species of *Pratapa*. The male is shining blue above, with a broad black apical border on the forewing; in the female the upperside is paler and greener, with black costal and distal borders on the forewing, and a broad black distal border on the hindwing. The post-discal band on the underside is inwardly diffuse, and the hindwing has black submarginal spots on the lobe and in space 2.

Genus *Charana* Nicéville

In both the Malayan species of *Charana*, the white (*C. jalindra*) or pale yellow (*C. mandarinus*) underside has the distal margins broadly bordered with ferruginous brown, and the inner half of this marginal band is more deeply coloured. On the hindwing beneath, there is a black spot on the lobe in addition to the orange-crowned black tornal spot in space 2. The genus is distributed from India to Malaysia.

C. jalindra burbona (Hewitson) has the upperside deep shining blue in the male, with comparatively narrow black distal borders, while the female is dark brown, except for the pale blue tornal area on the hindwing. The larva of *C. jalindra* is unicolorous green, and it feeds on *Loranthus elasticus*. The species occurs from India to Malaysia, and is found in primary forest at the usual elevations in Malaya.

The male of *C. mandarinus* (Hewitson) is shining greenish blue, with broad black apical borders on both wings; the female is dark brown, with black submarginal spots on the whitened tornal area. Distributed from Sikkim to Neomalaya, and confined to the mountains in Malaya, where it is very rare.

Key for the separation of the species of CHARANA

- 1 (2) Underside with the basal two-thirds of the wings white.
C. jalindra (Genitalia, Plate 15, fig. 235)
- 2 Underside with the basal two-thirds of the wings pale yellow.
C. mandarinus (Genitalia, Plate 15, fig. 236)

Genus *Jacoona* Distant

This genus comprises an assemblage of species in which females of some species are so similar that separation is difficult, while the males show such diversity in secondary sexual characters that, until recently, the six Malayan species were separated into four genera.

In the male of *J. anasuja* (the type species), veins 11 and 12 on the forewing are shortly anastomosed, and are then free to the costa. In the female of this species, and in all other forms of *Jacoona*, veins 11 and 12 are free. The forewing has vein 8 present in the male of *J. amrita*,

J. fabronia and *J. scopula*, but missing in the male of the remaining three species, and in all females.

The male of *J. anasuja* has a black oval brand in the outer two-thirds of the cell of the forewing. In *J. amrita*, *J. fabronia* and *J. gama* (which species formerly comprised the genus *Neocheritra* Distant), the male has, on the basal portion of vein 7 on the upperside of the hindwing, a black brand which is oval in the first two species and circular in *J. gama*, and, at the mid-dorsum on the forewing beneath, there is a corresponding hair tuft which is brown in *J. gama* and whitish in the other two species. The male of *J. scopula* (representing *Thrix* Doherty), has, in the dorsal area on the upperside of the forewing, an oblique pouch containing a pink extrusible hair tuft. The male of *J. hypoleuca* (the type species of *Manto* Nicéville) has, on the hindwing, a large black oval brand around the origins of veins 6 and 7, overlying which is a black recumbent tuft, and a corresponding nacreous area along the dorsum on the forewing beneath. The male genitalia follow the usual pattern in the Theclinae, and show considerable differentiation (see Plates 15 and 16, figs. 237-241).

The genus is distributed from Sikkim to Burma and Malaysia, and only *J. amrita* and *J. anasuja* are other than very rare in Malaya.

Key for the separation of the species of JACOONA

- 1 (6) Underside hindwing the inner black subternal stripes in spaces 1a and 1b not in line, the ends widely separated, and the stripe in space 1a nearer the termen. *J. anasuja*
- 2 (3) Forewing vein 7 ends on the termen. Underside forewing with the basal portion of the subcostal vein blackened. *J. fabronia*
- 3 Forewing vein 7 ends on the costa (except in the males of *J. amrita*, *J. fabronia* and *J. scopula*, where all veins are present). Underside forewing without a black basal streak. *J. gama*
- 4 (5) Underside white or whitish, with the distal areas ferruginous and overlaid with whitish fasciae. Underside hindwing black subternal spots conspicuously blue-crowned. *J. fabronia*
- 5 Underside with the whole of the forewing and the costal half of the hindwing ochreous. Underside hindwing black subternal spots not conspicuously blue-crowned. *J. gama*
- 6 Underside hindwing the inner black subternal stripes in spaces 1a and 1b more or less continuous, and the stripe in space 1a not conspicuously nearer the termen. *J. amrita*
- 7 (8) ♂ upperside forewing with the blue colour extending to the costa. ♀ upperside hindwing with the veins conspicuously blackened in the white tornal area. *J. amrita*
- 8 ♂ upperside forewing with the blue or green colour not to the costa. ♀ upperside hindwing with the veins in the white tornal area not conspicuously blackened. *J. scopula*
- 9 (10) Underside hindwing the inner black subternal stripes of equal width from the dorsum to vein 4. *J. scopula*
- 10 Underside hindwing the inner black subternal stripes decreasing in width from the dorsum towards the termen. *J. hypoleuca*

Jacoona amrita amrita (C. and R. Felder)

Plate 46, figure 190, ♀

The Grand Imperial

In the male the upper surface is shining royal blue, with the apical areas of both wings broadly black bordered. The female is dark brown, with large black quadrate submarginal spots and conspicuously blackened veins on the whitened tornal area of the hindwing. On the underside,

the forewing and the costal half of the hindwing are brownish orange ; the rest of the hindwing is white, with the large black submarginal spots in spaces 1a, 1b and 2 inwardly bounded by an irregular broken black line.

The butterfly may be taken singly in open forest at all usual elevations ; it is always rare, and the female appears to be the commoner sex. The species is distributed from south Burma to Neomalaya.

A species of about the same size as *J. amrita*, which can be separated from its congeners by the blackened basal portion of the subcostal vein on the forewing beneath, is *J. anasuja anasuja* (C. & R. Felder). The male is deep shining blue with a short and obscure oblique blue band running across the black apical border on the forewing. The butterfly occurs from south Burma to Neomalaya, and is rare in lowland forest in Malaya.

In the very rare *J. scopula nisibis* (Nicéville), the male has the baso-dorsal area of the forewing, and the hindwing below the cell, sparsely dusted with pale blue, and the white tornal area on the hindwing is separated from the pale blue area by a series of black interneural spots. The female suggests a small specimen of *J. amrita*, but the veins in the white tornal area on the hindwing above are not blackened. Neomalaya and Nias.

The male of *J. hypoleuca terana* (Seitz) is shining bluish green, with the apical two-thirds of the forewing and the distal margin (narrowly) and cell of the hindwing black ; the underside is almost entirely a deep orange. The female is dark brown above, with large black contiguous spots on the whitened tornal area of the hindwing, and the underside as usual in the genus. Distributed from south Burma to Malaysia, and also in the Rhio Archipelago.

In both sexes of *J. gama gama* (Distant) the upperside is dark brown with a white tornal area on the hindwing, and the male has sparse blue scaling on the hindwing. The species is distinctive in the regular series of black tornal spots on the hindwing above, these spots increasing towards the tornus and the spot in space 1b is as near the termen as that in space 2. A very rare butterfly found in south Burma and Neomalaya.

J. fabronia (Hewitson) is easily recognised by the very distinct underside, in which the ferruginous distal areas are overlaid with whitish fasciae, and the hindwing black subtornal spots are prominently blue-crowned. The species occurs from Sikkim to Malaya, and is confined to the hills in the Peninsula, where it is extremely rare.

Genus *Suasa* Nicéville

In the single species which represents this genus, the orange area on the upperside of the forewing shows the same response to environment as in species of *Marmessus* (see page 349). Both sexes are dark brown above, the male with the hindwing blue below the radius, and the female with

prominent black spots on the whitened tornal area of the hindwing. In Assam and Burma both sexes have a large orange forewing patch, which is obsolete in the representatives of the species from Malaya and Sumatra.

S. lisides suessa Nicéville is very rare in Malaya and Sumatra. The underside is pure white, the forewing has an ochreous brown distal border, and a large cuneiform patch of slightly darker colour from the costa and continued linearly almost to the dorsum, and the hindwing has one or two black spots in space 7, narrow black submarginal lines, and the usual two black tornal spots.

Genus *Neomyrina* Distant

The single species which constitutes this genus cannot be mistaken for any other, on account of its large size and white Pierid-like appearance. It was formerly known under the name of the Tenasserim race *hiemalis* (Godman and Salvin).

Neomyrina nivea periculosa Fruhstorfer

Plate 46, figure 192, ♀

The White Imperial

The upperside is white, and the forewing has a broad black apical border, which is shot with purple in the male. The underside is white, with five grey macular transverse bands on each wing, and the black marginal spots in the lobe and in space 2 on the hindwing are overlaid with metallic-green scaling.

N. nivea is not common in Malaya, and is rarely found much above 3,000 feet. It is local, and usually several individuals are found together. It frequents forest paths, and is a high flyer and not easily captured.

The species is confined to south Burma, Siam, Malaya and Sumatra.

Genus *Ticherra* Nicéville

Very similar to *Cheritra*, but vein 3 of the hindwing is prolonged to form a short tail. The single species is distributed from Sikkim to Burma, Siam, Kedawi and Sumatra.

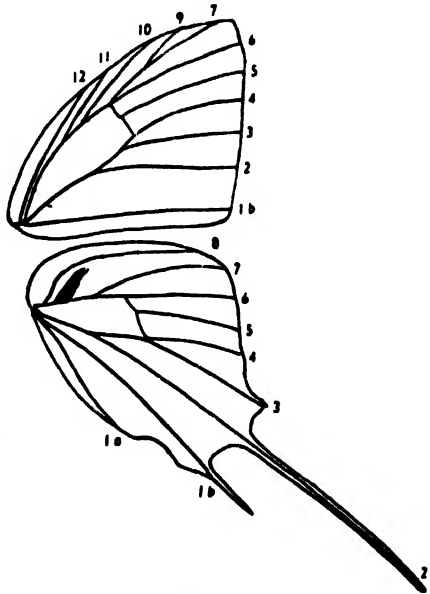
T. acte (Moore) has the upperside as in *Cheritra freja*, except that the male is deep violet, with narrow black distal borders on both wings. The underside has the markings as in *C. freja*, but very faintly indicated. As far as Malaya is concerned, the butterfly is known only from Perlis.

Genus *Cheritra* Moore

This genus comprises a single wide-spread species, of which the hindwing tail at vein 2 attains a length of over 20 mm. in some individuals. On the hindwing above, the male has a pale area of specialised scales at the base of space 7, and a thin tuft of dark hairs lying along the radius.

Cheritra freja frigga* FruhstorferPlate 46, figure 193, ♀***The Common Imperial**

The wings above are brownish purple in the male, dark brown in the female, with large black quadrate spots in spaces 1b and 2 in the tornal area on the hindwing, which is broadly whitened in the female and only narrowly so in the male. The underside is white, with most of the forewing and the apical area of the hindwing shaded orange brown; a narrow, dark, ochreous brown post-discal line on the forewing breaks into short stripes on the hindwing, where it becomes blacker towards the tornus, and the hindwing has also an interrupted black submarginal line, and black tornal spots on the lobe and in spaces 1b (faint and diffuse), 2 and 3, these spots being overlaid with the metallic-green scaling.

Fig. 129. *Cheritra freja* ♂. Venation.

The larva is green or flesh coloured, with a dorsal ridge, at the sides of which are brownish tubercles; the food plant is *Xylia dolabriformis*.

The butterfly is not uncommon, and may be taken singly in lowland forest in Malaya proper; the nominotypical form, with a more extensive white area on the hindwing above, occurs in the Langkawi Islands. The species is distributed from Ceylon and India to Malaysia.

Genus *Ritra* Nicéville

The two Peninsular representatives of this genus occur also in Sumatra and Borneo, and there is a further species allied to *R. aurea* found in the Philippines.

On the upperside of the forewing, the male has a large circular discal area of specialised scales, this area being blackish in *R. cinesia* and orange in *R. aurea*. It is not invariably present, however, for we have seen a Malayan example of *R. aurea* without the brand, and it is always absent in the Bornean race of *R. cinesia*. There is also a large black oval brand about the base of space 7 on the upperside of the hindwing in *R. cinesia*.

The forewing has the dorsum bowed in the male of *R. cinesia*, and straight in *R. aurea*.

R. cinesia cinesoides (Nicéville) has the upperside deep purple in the male, and dark brown, with a broad black submarginal line in the whitened tornal area on the hindwing, in the female. *R. aurea volumnia* (Fruhstorfer) has the upperside orange-brown in both sexes, but the female is duller, and has black spots in the whitened tornal area of the hindwing. Both are rare in lowland forest in Malaya.

Key for the separation of the species of *RITRA*

- 1 (2) Underside forewing and costal half of the hindwing greyish brown, with the black submarginal line on the hindwing overlaid with green metallic scales. *R. aurea*
- 2 Underside forewing and costal half of the hindwing ochreous brown, with the black submarginal line on the hindwing overlaid with purplish blue scales. *R. cinesia*

Genus *Eooxylides* Doherty

The genus is confined to south Burma and Malaysia. In the male of *E. tharis*, the upperside of the forewing has a dark circular brand around the origins of spaces 2, 3 and 4, and overlying it in space 2 is a smaller paler rounded area of specialised scales.

There is a single Malayan representative.

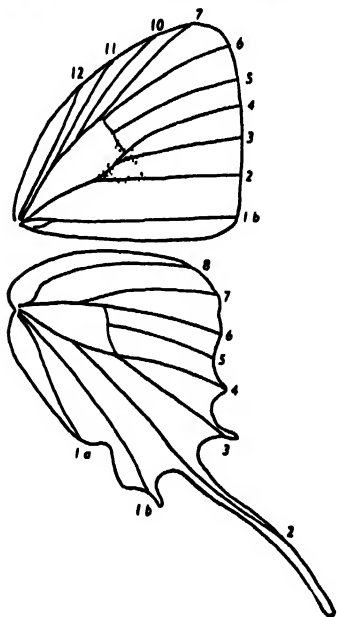


Fig. 130. *Eooxylides tharis* ♂. Venation.

Eooxylides tharis distanti Riley

Plate 46, figure 194, ♀

The Branded Imperial

The wings are dark brown above, with black confluent spots on the white tornal patch on the hindwing. In the male, the dorsal area of the forewing and the tornal area of the hindwing are faintly blue-dusted. The underside is reddish orange, the forewing unmarked, and the hindwing with large black submarginal spots on the white tornal area which is separated from the orange area by an irregular black line.

The butterfly is somewhat local, and, when present, is usually found in small numbers. It favours forest pathways at all usual elevations, and, except that it is never found at moist spots on the roadside, its habits are similar to those of *Marmessus theda* and *Hypolycaena erylus*.

Genus *Thamala* Moore

This genus comprises two species which are readily recognised by the elongate hindwing, the almost unicolorous ochreous underside and, in the male, the brilliant red upper surface.

T. moultoni Corbet is confined to Borneo, but *T. marci* is found from Burma to Neomalaya, although always as a rarity in the latter sub-region; in the Peninsula it appears to be confined to lowland forest.

In the male of *T. marci marci* (Hewitson) the wings are red above, with a black border on the costal and distal margins on the forewing, and on the inner margin on the hindwing. On the forewing above, the male has veins 2, 3 and 4 and the cubitus conspicuously blackened. In the female the upperside is dark brown, the forewing with an orange-red discal patch, with a large dark rectangular spot on the origins of veins 2, 3 and 4, and the hindwing with the tornal area bluish grey and unspotted. In both sexes the underside is ochreous brown (redder in the male), with a rather faint macular post-discal line on each wing and the tornal area of the hindwing bluish grey with obscure spots.

In the subspecies *sarupa* Corbet, which flies on the Langkawi Islands, the female has a more extensive orange-red discal patch on the forewing.

Genus *Marmessus* Hübner

Normally, *M. ravindra* and *M. rufotaenia* have vein 9 absent on the forewing, but occasional individuals of the former species are found with this vein present.

In the male the hindwing tail at vein 3 is very short. The male of *M. ravindra* has, on the hindwing, a large oval brand about the origin of vein 7, with a nacreous area on the costal edge, and a whitened area below it; there is a corresponding buff oval brand lying along the basal portion of vein 1b, and a dorsal nacreous area on the forewing beneath. The male of *M. theda* has a dark brown brand about the base of space 6 on the hindwing above, and a corresponding large nacreous area on the forewing beneath. In *Marmessus*, the male genitalia are aberrant, the uncus comprising two stout fingers; there is no gnathos, and the valvae are tapered towards the apex. The genitalia of *M. ravindra* and *M. rufotaenia* are somewhat

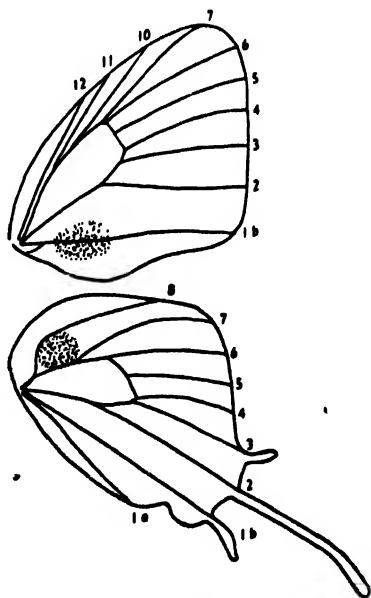


Fig. 131. *Marmessus ravindra* ♂. Venation.

similar, although there is no difficulty in separating these species by the shape of the valvae; *M. scaeva* and *M. estella*, and *M. theda* and *M. scudderii* also form pairs of species with rather similar male genitalia (Plate 16, figs. 242-247).

The genus is remarkable for the phenotypic variation shown by most of its members. In India, Burma and Siam, the sexes of *M. ravindra*, *M. scudderii* and *M. rufotaenia* and the female of *M. theda* have a large orange patch on the forewing which is absent from the corresponding representatives from Malaysia. *M. ravindra* is curious, however, in that the orange patch is present in Nias, and it reappears in some areas in Borneo. A similar phenomenon is the tendency for the interspaces between the black lines in the distal half of the hindwing to be blackened in Malaysia.

M. ravindra shows an astonishing propensity for forming geographical races, and almost every sizeable island in Malaysia has its own subspecies. The genus is distributed throughout the Oriental Region except Ceylon and south India.

(Basic literature: Riley, 1942, 1945.)

Key for the separation of the species of *Marmessus*

- 1 (8) Forewing vein 9 present.
- 2 (5) Underside forewing post-discal band not uniform in width, and more or less broken in the middle.
- 3 (4) Underside forewing upper part of the post-discal band coalesced with the cell-end bar. *M. estella*
- 4 Underside forewing post-discal band well separated from the cell-end bar. *M. scaeva*
- 5 Underside forewing post-discal band of even width and unbroken.
- 6 (7) Hindwing tail at vein 2 long (8 to 10 mm.). Underside hindwing spaces between the paired stripes at the cell-end and in space 6 not blackened. ♂ upperside purple with irregular orange patch centrally on forewing, and the hindwing with a dark band about the base of space 6. *M. theda*
- 7 Hindwing tail at vein 2 short (5 mm.). Underside hindwing spaces between the paired stripes at the cell-end and in space 6 blackened. ♂ upperside with sparse bluish-grey scaling in the subapical area of the forewing and the discal area of the hindwing; no band. *M. scudderii*
- 8 Forewing vein 9 absent.
- 9 (10) Forewing longer than 12 mm. Underside hindwing narrow orange submarginal band from vein 1a to not beyond the middle of space 1b. ♂ upperside hindwing shining blue from the tornus to vein 6. *M. ravindra*
- 10 Forewing 10 to 11 mm. Underside hindwing narrow orange submarginal band continuous from vein 1a to vein 3, often beyond vein 3 in ♂, and usually to this vein in ♀. ♂ upperside hindwing brown with sparse bluish-grey scaling at the tornus. *M. rufotaenia*

Marmessus theda thesmia (Hewitson)

Plate 46, figure 197 ♀

The Dark Posy

Above, the male is a deep purple brown with a dull orange-brown discal patch on the forewing. The female is brown, with a bluish grey tornal patch on the hindwing, which has a few black submarginal spots. On the underside, the forewing is brownish orange and the hindwing white; the forewing is marked with darker transverse stripes, and the hindwing markings consist of black spots and lines, with the usual

metallic green scaling and black spots at the tornus. This species can be separated immediately from the rather similar *M. ravindra* in that the space between the two black stripes forming the cell-end bar on the hindwing beneath is white, and not filled in with black as in *M. ravindra*.

The butterfly is common on the outskirts of the forest and prefers the lowlands to the hills. The species has a restricted range, being confined to south Burma, west Siam and Neomalaya. The subspecies *renonga* (Corbet), which occurs from Victoria Point, in south Burma, to the Langkawi Islands, has a broad orange discal patch on the forewing in the female.

On the underside of *M. scaeva scaeva* (Hewitson) the basal half of the forewing and almost the entire hindwing are pure white; the markings are arranged much as in *M. theda*, but the forewing post-discal spot in space 3 is obsolete, and the spaces between the dark, narrow, post-discal stripes in the tornal half of the hindwing are not blackened. On the upperside, the male is black, with the tornal two-thirds of the hindwing blue, while the female is dark brown, with the tornal area of the hindwing bluish white. *M. scaeva* is largely confined to the hills in Malaya proper, although it occurs on the plains in the Langkawi Islands, where it is represented by the subspecies *melisa* (Hewitson). The male of *melisa* lacks the blue discal patch found on the forewing in the nominotypical form, and the costal area of the hindwing is orange. *M. scaeva* is distributed from Sikkim to Neomalaya.

Marmessus ravindra moorei (Distant)

Plate 46, figures 191 and 196 ♂

The Common Posy

In the male the forewing is dark brown and the hindwing a bright azure blue; the female is dark brown, with at least traces of an orange discal patch on the forewing, and a marginal series of black spots on the bluish grey tornal area of the hindwing. The underside colour and pattern are much as in *M. theda*, but the forewing is a brighter orange and the spaces between the parallel black lines which comprise the markings on the hindwing are heavily blocked in with black.

The butterfly is common in wooded localities throughout the Peninsula, and is found in company with *Hypolycaena erylus*, *Marmessus theda* and *Zeltus etolus*. Often the butterflies may be seen settled upside down with partially closed wings, and, as the filamentous tails are usually in motion, it seems probable that an insectivorous animal may mistake the tails for the antennae, for many specimens are taken in which symmetrical portions of the tornal area of the hindwings are missing.

The butterfly has been bred from larvae found on *Albizia falcata* in Malaya. The species is distributed from Burma to Malaysia.

M. scudderii biranta Riley, in the Langkawi Islands, and *M. scudderii perlis* Riley, in Perlis, are the local representatives of a species ranging from Burma to Neomalaya. As regards the orange discal area on the forewing, north Malaya is a transitional area, for this patch is prominent in Burma and Peninsular Siam but faint or absent in Sumatra, Borneo and the Mentawi Islands. The underside of Malayan *M. scudderii* suggests that of *M. theda*, but the paired stripes at the cell-end have the interspace blackened as in *M. ravindra*. From both species, *M. scudderii* differs in the more rounded forewing in both sexes.

Both sexes of *M. rufotaenia rufotaenia* Fruhstorfer suggest a very small female of *M. ravindra*, and, in both species, veins 8 and 9 are missing from the forewing. The male lacks the hindwing brand found in *M. ravindra*, and the hindwing is dark brown and not shining blue. The sexes can be differentiated by the more acute apex and rounded termen on the forewing in the male. *M. rufotaenia* is known also from south Burma (subsp. *archbaldi* Evans), Sumatra and Java, and the only known Malayan specimens were taken in Singapore.

Genus *Horaga* Moore

Wings blue, purple or brown above, with broad black costal and distal borders, and a well defined white discal spot on the forewing. The female is dingier than the male. Underside ochreous, or ochreous brown, with a white post-discal band on each wing, the forewing band usually broad and not continued much above vein 6, and that on the hindwing narrower and running to the costa; the hindwing has the usual two black tornal spots and metallic green scaling.

In *H. onyx* and *H. syrxinx*, the male has a buff oval brand along the basal half of vein 1b on the forewing beneath. The male genitalia, which are of the usual Thecline pattern, are sufficiently differentiated to assist in identification (Plate 16, figs. 248-250).

The butterflies chiefly inhabit lowland forest, although two of the Malayan species ascend the hills; they are usually taken singly. When disturbed they are rapid on the wing, but do not fly far.

Distributed from Ceylon and India through the Archipelago to New Guinea.

The two commonest species in the Peninsula are *H. onyx halba* Distant and *H. syrxinx maenala* (Hewitson). The latter (Plate 46, fig. 199 ♀) has the forewing more pointed and the upperside bluer in the male, and the forewing white discal spot smaller and narrower (it may even be obsolete in the male).

The male of *H. amethystus purpurescens* Corbet is without a white spot on the upperside of the forewing. *H. araotina* Evans is known from a single female taken on Pulau Angsa, off the Selangor coast. The specimen is dark brown above, with black marginal spots on the whitened tornal area of the hindwing; on the underside, the forewing white band

is narrow, while the broad white band on the hindwing extends to the termen below vein 6, and is marked with black spots.

(Basic literature : Corbet, 1941*d*.)

Key for the separation of the species of HORAGA

- 1 (8) Underside hindwing white post-discal band not extending to the termen.
- 2 (5) Underside hindwing white band narrow and uniform throughout, not narrowing in space 5.
- 3 (4) Underside hindwing white band overlaid with green metallic scales, at least in spaces 6 and 7. *H. anethystu* (12.0-14.5 mm.)
- 4 Underside hindwing white band (which may be almost obsolete), not green-scaled above vein 3. *H. albimacula* (11.5-12.0 mm.)
- 5 Underside hindwing white band more or less broad, and narrowing in space 5.
- 6 (7) Upperside purple blue in ♂, duller and dingier in ♀; forewing white discal spot almost quadrate, and the veins passing through it not dark dusted in ♂. *H. onyx* (12.0-13.0 mm.)
- 7 Upperside bright clear blue in ♂, ♀ purple-blue but not as dingy as in *H. onyx*; forewing white discal spot narrower, and with dark dusted veins passing through the spot in ♂. Underside more ochreous than in *H. onyx*. *H. syrx* (12.5-14.0 mm.)
- 8 Underside hindwing white post-discal band extending to the termen. General appearance of underside suggests *Araotes lapithis*. ♂ unknown. *H. araotina* (13.0 mm.)

Genus *Catapaecilma* Butler

Differs from all other Malayan Thecline genera, except *Thecla*, in the hairy palpi. The butterflies are easily recognised by the metallic green scales overlying the reddish-brown bands and fasciae on the underside. Above, the male is purple, and the pale blue female has black costal and distal borders on the forewing.

The male genitalia show specific differences in the shape of the valva and aedeagus (Plate 16, figs. 251-253).

The larva of *C. major* has been described as green, with a violet-red dorsal band, and in India it feeds on *Terminalia paniculata*.

The genus is distributed from Ceylon and India to Malaysia and the Philippines.

The butterflies frequent lowland forest in Malaya, and are usually taken singly. The only species which is not rare in Malaya is that represented by *C. major emas* Fruhstorfer, and it occurs from Ceylon and India to Formosa and Malaysia. The smaller *C. elegans zephyria* Fruhstorfer differs in that, on the underside of the forewing, there is no post-discal stripe in spaces 4 and 5 between the cell-end spot and the submarginal fascia, and *C. subochrea evansi* Pendlebury is distinctive in the deep ochreous underside. The largest member of the genus, *C. bubases* (Hewitson), has not been found in Malaya since it was taken by Wallace in 1854, although a female is recorded from Borneo.

(Basic literature: Corbet, 1941*e*.)

Key for the separation of the species of CATAPAECILMA

- 1 (2) Underside forewing with the reddish-brown spots in spaces 1b, 2 and 3 conjoined with the cell-end stripe and the spots in spaces 4 and 5 to form a median Y. *C. major*
- 2 Underside forewing markings not forming a median Y.
- 3 (4) Underside forewing without dark stripes or spots beyond the cell-end stripe, and the cell-end stripe hardly continued below vein 1b. *C. elegans*

- 4 Underside forewing with a dark stripe or black spots in spaces 4, 5 and 6 beyond the cell-end stripe.
 5 (6) Forewing less than 14 mm. Underside forewing with a reddish-brown stripe in spaces 4, 5 and 6 more or less parallel to the termen. *C. subochrea*
 6 Forewing longer than 14 mm. Underside forewing with an oblique series of black spots in spaces 4, 5 and 6. *C. bubases*

Genus *Chliaria* Moore

Very close to *Hypolycaena*, but the antennae immediately differentiate *Chliaria* from all other genera of Theclinae. The male genitalia do not differ very markedly from one species to another in *Chliaria* (indeed, those of *C. othona* and *C. tora* are similar), and show a similarity of design with those of *Hypolycaena* (see Plates 16 and 17, figs. 254-257).

The male is shining blue above in most species, but purple in *C. merguia*, and with reddish-brown forewing and deep purple hindwing in *C. balua*. The female is dark brown, with a white discal patch on the forewing, or a white tornal area, with black marginal spots, on the hindwing; both wings have whitened areas in *C. kina*. The underside is white to grey, with a post-discal band on each wing (that on the hindwing often broken), and usually with dark spots in space 7 on the hindwing; in some species the apical area of the forewing is tinged ochreous brown.

The larvae feed on the flowers of orchids; that of *C. kina* is green, with rosy hair and red dorsal and subdorsal lines, and feeds on *Rhynchostylis retusa*.

All the species are rare in Malaya, where they are usually taken singly, and the females are very rare indeed in some species. The genus is distributed from north India to Formosa, Indo-China and Malaysia.

C. kina celastroides Corbet and *C. othona pahanga* Corbet are both montane species in Malaya proper, and can be recognised by the broad post-discal spots in spaces 6 and 7 on the hindwing beneath. *C. amabilis lisba* Corbet is probably the least uncommon species in Malaya; the male is deep shining blue above, with a diffuse black border on the forewing, and the hindwing beneath has no black spots in space 7.

(Basic literature: Corbet, 1940b.)

Key for the separation of the species of *CHLIARIA*

- 1 (8) Underside hindwing with a prominent black spot near the base of space 7.
- 2 (5) Underside forewing apical area not broadly shaded with orange brown; post-discal band in spaces 4 to 7 definitely broader than in spaces 1b, 2 and 3.
- 3 (4) Underside forewing without a small black costal spot above the middle of the cell. *C. kina*
- 4 Underside forewing with a small black costal spot above the middle of the cell. *C. othona*
- 5 Underside forewing apical area broadly shaded with rich orange brown; post-discal band almost uniformly wide throughout its length.
- 6 (7) Underside hindwing with a stripe of metallic green scaling (on a white ground), running along the outer edge of vein 1b from the white anteterminal line to the black line bounding the orange tornal area. ♂ upperside blue with a black subapical border on the forewing; ♀ upperside dark brown, with a pale bluish-white tornal area on the hindwing. *C. tora*
- 7 Underside hindwing orange tornal area continuing from vein 1b to vein 3 or 4, and only a few green scales (on the orange ground), on the outer edge of vein 1b. ♂ upperside deep senna brown, with the basal half of forewing more reddish, and the hindwing deep lustrous purple in reflected light. ♀ upperside dark brown, with a white tornal area on the hindwing. *C. balua*

- 8 Underside hindwing without a spot at the base of space 7.
 9 (10) Underside hindwing with a series of prominent black submarginal spots internal to the large black tornal spot in space 2. *C. amabilis*
 10 Underside hindwing without black markings internal to the black tornal spot in space 2. *C. merguia*

Genus *Hypolycaena* C. and R. Felder

The underside markings are much as in *Chliaria*, comprising a cell-end bar and a narrow dark post-discal band on each wing.

The male of *H. erylus* has a prominent black rounded area of specialised scales in the discal area on the forewing above.

The genus is distributed from Ceylon and India through the Malay Archipelago to Australia, New Guinea and the Bismarcks; it is also strongly represented in tropical Africa.

Key for the separation of the species of *HYPOLYCAENA*

- 1 (2) Underside hindwing with an orange-brown stripe near the base of space 7. *H. thecloides*
 2 Underside hindwing without a stripe at the base of space 7. *H. erylus*

Hypolycaena erylus teatus Fruhstorfer

Plate 46, figure 195 ♀; genitalia, Plate 17, figure 258

The Common Tit

On the upperside, the male is deep lustrous purple with a conspicuous black discal brand on the forewing; the female is dull brown, with an obscure dark post-discal line on each wing, and black marginal spots on the greyish white tornal area on the hindwing. The underside is pale greenish grey, with a cell-end bar and a narrow reddish brown post-discal line on each wing; the forewing termen is shaded with ochreous brown and the hindwing has a black, orange-crowned, tornal spot in space 2 and a smaller black spot on the lobe.

The larva is green, with indistinct dark dorsal and subdorsal lines; it feeds on *Vangueria spinosa* and *Cinnamomum zeylanicum*, and is attended by ants.

The butterfly is common on the plains, occurring in all types of vegetation from the coastal mangrove to the forested foothills. Often, it is a visitor to moist spots on forest roads.

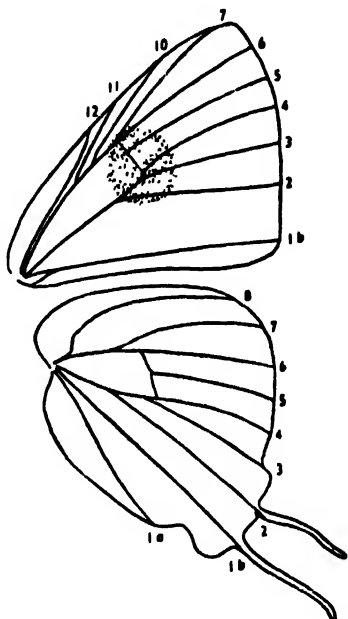


Fig. 132. *Hypolycaena erylus* ♂. Venation.

The species ranges from Sikkim to Indo-China, and through the Malay Archipelago to New Guinea.

In both sexes of *H. thecloides thecloides* (C. and R. Felder) the upper-side is dark brown, with a black-spotted orange tornal area on the hindwing; the greyish white underside has orange brown post-discal bands, and the apical area of the forewing is shaded with the same colour. The species is distributed from south Burma to Malaysia, and frequents lowland forest in Malaya, where it is rather uncommon.

Genus *Zeltus* Nicéville

Allied to *Hypolycaena*, from which it differs chiefly in the very long tail (about 12 mm.) on the hindwing. The underside has the same general pattern as *Hypolycaena*, but the hindwing has a prominent black spot near the base of space 7.

The single species is distributed from India to Hainan, Malaysia and the Philippines.

Zeltus amasa maximinianus Fruhstorfer

Plate 46, figure 198 ♀

The Fluffy Tit

This species was formerly known under the preoccupied name of *Z. etolus* (Fabricius).

The male has the baso-dorsal area of the forewing and the whole of the hindwing, except the apical area, pale azure blue; the rest of the wing is black, shot with deep purple. The female is ferruginous brown, and the whitish tornal area on the hindwing is marked with black marginal spots and obscure greyish fasciae. The underside is pale bluish white, with the apical areas shaded ochreous brown (broadly so on the forewing); the cell-end bars are darker ochreous brown, and each wing has a narrow post-discal, and an obscure submarginal, line; the hindwing has a black marginal spot in space 2 and on the lobe.

Z. amasa is a common butterfly along forest roads in the lowlands; it may be seen in flight among shrubs and bushes some six feet or so from the ground, and it is also found settled at moist spots on the road.

The larva is green, finely hairy, and with black and red markings. The food plant is not known.

Genus *Remelana* Moore

By some authors the single representative of this genus has been associated with *Tajuria*, but it differs distinctly in the hairy eyes, the longer and more pointed third segment of the palpi, the more quadrate wings, and the deep purple colouring on the upperside.

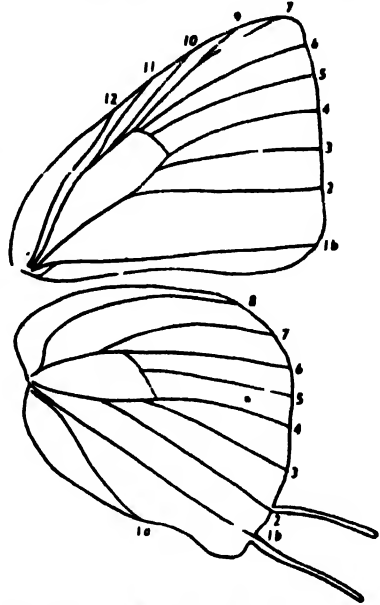
The male has an androanial patch on forewing; the genitalia are unusual in the dentate inner edge of the paired gnathos.

Remelana jangala travana (Hewitson)*Plate 46, figure 202 ♂; genitalia, Plate 17, figure 259***The Chocolate Royal**

Above, the male is a deep lustrous purple, with broad black bordering on both wings; the female is paler, and differs from the male also in that the basal portions of spaces 2 and 3 on the forewing are entirely purple. The under surface is dark brown, with a narrow, darker brown, post-discal line on both wings; the two prominent black tornal spots on the hindwing are crowned with brilliant metallic green scaling.

The butterfly is not uncommon in Malaya in well-wooded localities at all usual elevations, and its habits recall those of *Arhopala* species. Nothing appears to be known regarding the early stages.

R. jangala is distributed throughout the Oriental Region, except Ceylon and south India.

Fig. 133. *Remelana jangala* ♂. Venation.**Genus Artipe Boisduval**

This genus is easily recognised by the green underside which, in *A. eryx*, has a narrow white macular band on each wing, and some white markings beyond the band in the tornal area of the hindwing.

A. eryx (Linnaeus) occurs from Sikkim to south China, Malaya and Borneo, and appears to be extremely rare in Neomalaya. The male is shining blue with black bordering, while the female is dark brown, with a white tornal patch on the hindwing bearing a series of dark conjoined submarginal spots.

Genus Virachola Moore

The species usually placed in this genus are more robust than those of *Rapala*, but the two are evidently closely allied, and the males have similar secondary sexual characters. The larvae feed on seeds of various fruits. The few Oriental representatives are distributed from Ceylon and India to Neomalaya, and the genus appears to be strongly represented in tropical Africa.

The sole Malayan species is *V. smilis smilis* (Hewitson), which is confined to the mountains, and appears to be very rare throughout its range; it occurs also in Burma, the Andaman Islands and Borneo.

The male of *V. smilis* is deep shining blue above, with very broad black bordering on both wings; the female is paler and has narrower borders. The buff brown underside is purple-glazed, with the dark spotting of *Arhopala*, but the forewing post-discal band is completely broken at vein 4.

Genus *Deudorix* Hewitson

Differs from *Rapala* essentially in the absence of secondary sexual characters in the male.

Distributed from Ceylon and India, through the Malay Archipelago, to Australia, and as far east as Samoa.

Key for the separation of the species of *DEUDORIX*

- 1 (2) Underside silvery white, both wings unmarked except that the apical area of the forewing is tinged with ochreous (broadly so in ♀), and the tornal area of the hindwing is marked with black spots and lines. *D. hypargyria*
- 2 Underside greyish brown to buff brown, and each wing with a cell-end bar and a post-discal band.
- 3 (4) Underside post-discal bands indicated by straight white striae, and the forewing band continued below vein 2. *D. epijarbas*
- 4 Underside post-discal bands composed of rounded conjoined spots, and the forewing band not continued below vein 2. *D. elioti*

Deudorix epijarbas cinnabarus Fruhstorfer

Plate 46, figure 203 ♂; Plate 47, figure 204 ♀; genitalia, Plate 17, figure 260

The Cornelian

The wings above are red in the male, with black bordering on the forewing, and the costal area broadly blackened on the hindwing; the female is dark brown and unmarked. The underside is buff to greyish brown, with the broad post-discal bands and cell-end bars very slightly darker than the ground, and defined by narrow white stripes.

The larva is dull ochreous, blotched with leaden black, and with the lateral edge furnished with rather long and stiff hairs. The larval foods include the fruit of pomegranate and, in other parts of the butterfly's range, the seed capsules of *Aesculus indicus*.

The butterfly may be taken flying around rather tall bushes and shrubs. It is nowhere common in Malaya, but frequents lowland forest, and becomes scarcer as the hills are ascended. The species has an extensive distribution abroad, ranging from Ceylon and India to Australia, New Guinea and through the south Pacific islands to the New Hebrides, Tonga and Samoa.

In the rather similar *D. elioti* Corbet (genitalia, Plate 17, fig. 261) the upperside is duller, the hindwing being strongly black dusted, and the underside bands are more macular. The forewing has the apex blunter, the termen is more rounded, and the valva is more gradually tapered than in *D. epijarbas*.

D. hypargyria hypargyria (Elwes) also resembles *D. epijarbas* above, but, in the male, the upperside is brighter and more orange, and the

wings have a purple gloss, and the female has a white tornal area on the hindwing. The species is rare in forest country in Malaya at the usual elevations. Abroad, it occurs from Assam and Burma to Malaysia.

Genus *Rapala* Moore

The wing shape, with comparatively short hindwing tail at vein 2 and prominent lobe in space 1a, is characteristic of the genus, as is the pattern of the underside, viz., a narrow white-edged post-discal band on both wings, and a black tornal spot in space 2 and on the lobe on the hindwing. Usually, the ground colour on the under surface is dark grey to buff brown, and, in some species, there are bars at the end of the cells. The uniformity of the underside markings makes identification of the species difficult.

The male has a smooth patch of specialised scales at the base of space 7 on the hindwing above, and a hair-tuft at the mid-dorsum on the forewing beneath. In some species this sex has the basal portions of veins 2, 3 and 4 on the upperside of the forewing thickened and darkened; in *R. elcia* the races from Malaya, Sumatra and the Philippines have a dark triangular brand at the bases of spaces 2 and 3 on the forewing, this brand being absent from the representatives from other parts of the range from Assam to Java and Borneo.

Almost all the species exhibit sexual dimorphism in the colour of the upperside; normally, the male is red, reddish brown or deep blue, while the female is dark brown or a pale purple-blue.

The male genitalia are rather uniform in design, but are sharply characterised by the slender, tapered valvae, which are united for some distance along the ventral edge, and the large aedeagus which is furnished with prominent cornuti at the distal extremity. The genitalia are of some diagnostic value, although, usually, closely related species have similar genitalia (Plate 17, figs. 262–265).

Distributed from Ceylon and India to Malaysia, with a few species reaching the Philippines and Celebes, and one or two further species established in New Guinea and Australia.

(Basic literature: Corbet, 1939b.)

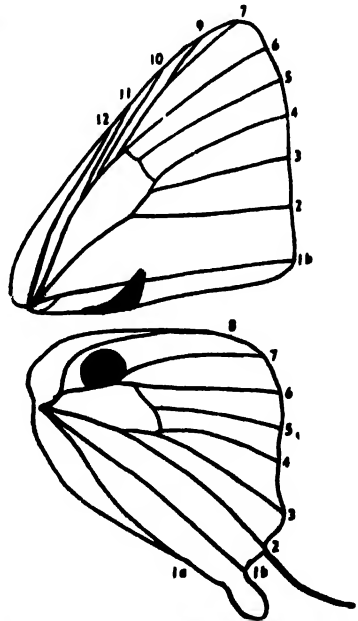


Fig. 134. *Rapala iabus* ♂. Venation.

Key for the separation of the species of *RAPALA*

- 1 (8) Underside pattern abnormal.
- 2 (3) Underside purple-brown and purple-washed, with large white-edged dark spots arranged as in *Arhopala*. *R. subguttata*
- 3 Underside pattern not as above.
- 4 (7) Underside pale yellow.
- 5 (6) Underside pale ochreous, with prominent brown markings on each wing comprising a large rounded discal spot, a broad post-discal band and a broad distal border. *R. abnormis*
- 6 Underside egg-yolk yellow, with the black markings on the forewing comprising a black cell-stripe extending below the cubitus, a wedge-shaped costal spot and a spot in space 3. *R. domitia*
- 7 Underside pale brown with narrow white lines arranged as in species of the *Nacaduba pavana* group. *R. kessuma*
- 8 Underside pattern normal, comprising a cell-end bar (not always present), a narrow post-discal band, and a rather indistinct submarginal fascia on each wing.
- 9 (26) Underside forewing post-discal band curved, and more or less parallel to the distal margin.
- 10 (19) Upperside red or reddish brown in ♂, and brown in ♀ (except in *R. pheretima* ♀, which is steely blue).
- 11 (12) Underside forewing with a broad bar at the end and in the middle of the cell (not always present in the ♀). ♂ underside forewing tuft ochreous. *R. pheretima*
- 12 Underside forewing without a bar in the middle of the cell. (*iarbus* group)
- 13 (16) Underside ochreous. Upperside hindwing lobe yellow.
- 14 (15) Underside ochreous yellow; hindwing black tornal spot in space 2 narrowly orange-crowned. ♂ underside forewing tuft orange-yellow. *R. dioetas*
- 15 Underside brownish ochreous; hindwing black tornal spot in space 2 broadly orange-crowned. ♂ underside forewing tuft dark brown. *R. dienees*
- 16 Underside grey in ♂, paler grey in ♀.
- 17 (18) Upperside hindwing lobe mostly black or dark brown. Underside hindwing black tornal spot in space 2 narrowly yellow-crowned. Upperside forewing with black dorsal border in ♂, and with a diffuse orange discal patch in ♀. *R. drasmos*
- 18 Upperside hindwing lobe orange-red. Underside hindwing black tornal spot in space 2 broadly crowned with orange-red. Upperside forewing no dorsal border in ♂, and no orange discal patch in ♀. *R. iarbus*
- 19 Upperside some shade of blue in both sexes.
- 20 (25) Upperside dull. ♂ upperside forewing with brownish stigma along veins 2, 3 and 4. (*varuna* group)
- 21 (24) Underside post-discal bands narrow as usual, and whitened outwardly. ♂ upperside dark slate blue, and shot deep blue. ♀ upperside dull purple-blue, shading to black at the wing margins.
- 22 (23) Underside brown to purple-brown, and usually purple-washed. ♂ upperside shot purple-blue in the dorsal half of forewing and most of the hindwing; underside forewing tuft pale ferruginous brown. ♀ upperside wing bases purple. *R. manea*
- 23 Underside greyish brown, with a greenish hue in the male, and tending to ochreous-brown in the female. ♂ upperside hindwing shot blue; underside forewing tuft dark brown. ♀ upperside wing bases greenish. *R. scintilla*
- 24 Underside post-discal bands broad and narrowly white-edged on both sides. ♂ upperside dark shining greenish indigo blue, shading to a broad black apical border on the forewing; underside forewing tuft dark brown. ♀ upperside purple-blue, shading to black at the wing margins. *R. varuna*
- 25 Upperside bright shining blue. Underside with very dark broad post-discal bands which are not white-edged. ♂ upperside forewing with a prominent dark triangular post-discal band, and underside forewing tuft dark brown. *R. elcira*
- 26 Underside forewing post-discal band straight to vein 2, and directed towards the tornus. Upperside dark steely blue, paler in ♀. *R. missa*

***Rapala iarbus iarbus* (Fabricius)**

Plate 47, figure 205 ♂, 206 ♀

The Common Red Flash

The wings are red in the male, with black costal and distal borders, and veins 2, 3 and 4 blackened on the forewing; the female is a coppery brown and unmarked. The underside is greyish buff, with a darker

post-discal line which is outwardly whitened, and the space between the black tornal spot in space 2 (which is orange-crowned), and the black spot on the lobe is covered with blue scaling.

The larva is red or ochreous yellow, with black markings and a subdorsal stripe. It feeds on the young shoots of *Nephelium lappaceum* (rambutan) and the blossoms of *Melastoma polyanthum*. Although *R. iarbus* cannot be described as common, more specimens of this butterfly are obtained than of all the other *Rapala* species together. It seems to be more abundant in the northern part of the Peninsula. The butterflies are found in lowland forest, and are usually taken flying around, or settled on, the leaves of moderately tall shrubs in forest clearings. Of this species, Biggs (1881) wrote "One of the few butterflies which I have found abundant in a tapioca clearing."

R. iarbus is distributed from Ceylon and India to Malaysia and the Lesser Sunda Islands.

There are three other Malayan species of *Rapala* in which the sexes have the upperside colouring much as in *R. iarbus*, except that, in the male, the forewing black border is continued along the dorsum, and, in *R. dieneces* and *R. drasmos*, the cell area of the hindwing is blackened. In *R. dioetas barthema* (Distant), the male has the upperside browner than in the other species, and the black bordering is diffuse. In both this species and in *R. dieneces dieneces* (Hewitson), the under surface is ochreous, while it is grey in *R. drasmos cowani* Corbet. *R. dioetas* and *R. dieneces* are found in lowland forest, and occur from India to Malaysia (to Celebes also in the case of the former species), as do most of the *Rapala* species, but the mangrove-loving *R. drasmos* is known only from Borneo and Malaya.

In another section of the genus, the males are some shade of deep blue, while the females are pale purple blue with the outer margins dusky. In *R. varuna orseis* (Hewitson), the male is indigo blue above, and, in both sexes, the underside is darker and has broader post-discal bands than usual. The post-discal lines are narrow in *R. manea chozeba* (Hewitson) and *R. scintilla scintilla* Nicéville; in the male of the former both wings are blue shot, while this colouring is confined to the hindwing in the latter; the females differ in that the wing bases are tinged greenish in *R. scintilla*. These butterflies are lowland forest and even open country species, as is the beautiful blue *R. elcia rhoecus* Nicéville, which was formerly, but incorrectly, known as *R. sphinx* (Fabricius). In the very rare montane *R. nissa pahangana* Pendlebury and Corbet, both sexes are a pale steel blue above, and the purple-washed underside is distinctive in the oblique post-discal line on the forewing.

R. pheretima sequeira (Distant) can be recognised by the broad cell-end bars on the underside of both wings, and the spot in the middle of the forewing cell, which, however, may be obsolete in the female. The male is dark reddish brown above, but the female is a dull steel blue, as

in some species of the *varuna* section. *R. pheretima* occurs in primary and secondary growth on the plains, and is the commonest *Rapala* species in the Peninsula after *R. iarbus*.

There are a few species of *Rapala* with an aberrant underside pattern. In the rare, but widely distributed, *R. domitia domitia* (Hewitson), the underside is yellow with a few black spots on the forewing. *R. abnormis abnormis* Elwes is a montane insect which is not uncommon on Bukit Kutu, Selangor; the underside is very pale yellow with broad post-discal bands and large discal spots on both wings. The underside pattern of *R. kessuma deliochus* (Hewitson), which is a rare insect on the Malayan lowlands, suggests a *Nacaduba* species of the "4-line Blue" type. *R. domitia* is confined to Neomalaya, but the two other species just mentioned range from Burma to Malaysia.

The larvae of *Rapala* have been found on a variety of food plants. In addition to those mentioned under *R. iarbus* these are, in various parts of their ranges, *Antidesma*, *Zizyphus xylopyrus*, *Lantana camara*, *Eleagnus ferruginea*, *Quisqualis*, *Acacia caesia* and the saxifrage *Astilbe rivularis*.

Genus *Sinthusa* Moore

Rather small and inconspicuous butterflies, weak in flight, and found among shrubs and bushes within a few feet of the ground. In the males of both the Malayan species there is a pale band around the base of space 7 on the upperside of the hindwing, and, on the forewing beneath, a dark, brown or black recumbent hair-tuft at the mid-dorsum.

On the upperside, the male has the forewing dull indigo-blue with a broad black distal border, and, except for the black costal border, the hindwing is shining bluish purple. The female is dark brown, with rather obscure black spots on the whitened tornal area on the hindwing. In both sexes, the underside is greyish white, and the forewing has the apical area reddish brown and an ochreous-brown cell-end stripe and post-discal line.

S. nasaka amba (Kirby) somewhat resembles *Hypolycaena thecloides* beneath, having the forewing post-discal line continued (but brokenly) on the underside of the hindwing. *S. malika amata* Distant has, on the hindwing beneath, a short brown cell-end stripe and the brown post-discal spots arranged in pairs. Both species have a black tornal spot in space 2 and another on the lobe of the hindwing, and the tornal area is rather sparsely dusted with metallic green scaling.

S. nasaka is distributed from Sikkim to Burma and Malaysia, *S. malika* is confined to Malaysia, and other species are found in the Philippines and Celebes.

Key for the separation of the species of *SINTHUSA*

- 1 (a) Underside hindwing with a prominent brown cell-end stripe and a post-discal fascia comprising separated dark spots. *S. malika*
- 2 Underside hindwing cell-end stripe faint, and the post-discal fascia broken and consisting of narrow ochreous brown stripes as on the forewing. *S. nasaka*

Genus *Bindahara* Moore

The single species which comprises this genus is distributed from Ceylon and India through the Malay Archipelago to New Guinea, Australia and the Solomon Islands; it is always rare in Malaysia.

The male has a pale band at the base of space 7 on the hindwing above, and there is a corresponding recumbent black hair-tuft at the mid-dorsum on the forewing beneath.

The male has the wings deep blackish brown, except the apical area of the forewing which is ferruginous; the female is reddish brown with a large black spot in space 2 on the extensively whitened tornal area of the hindwing. The underside markings comprise a ferruginous cuneiform post-discal band and a broad ferruginous stripe in the cell on the forewing; the hindwing has four blackish subbasal spots, a cell-end stripe, and a post-discal fascia consisting of paired short stripes, of which the interspaces are darkened in spaces 6 and 7; the black tornal spots on the lobe and in space 1b and 2 on the hindwing are overlaid with metallic green scaling.

B. phocides phocides (Fabricius) frequents rather tall bushes in primary forest at all usual elevations in the Peninsula, and is usually taken singly.

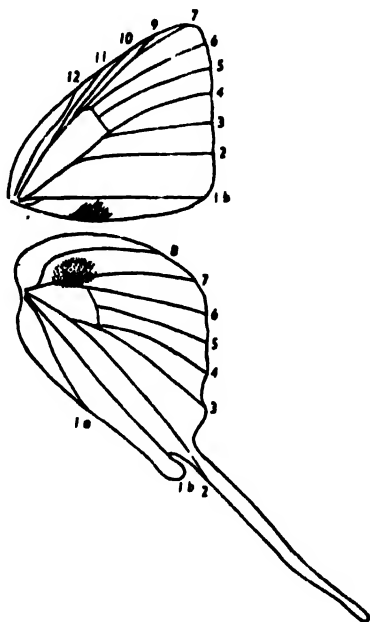


Fig. 135. *Bindahara phocides* ♂. Venation.

Genus *Araotes* Doherty

The single Malayan representative, *A. lapithis uruwela* Fruhstorfer, can be recognised by the very characteristic under surface. The male has the forewing black, except for the baso-dorsal area which is deep shining blue, as is almost the whole of the hindwing. The female is dark brown, with very obscure spots on the slightly bluish-white tornal area of the hindwing. On the underside, the distal half and the baso-costal area of the forewing and the distal quarter of the hindwing are pale brownish ochreous. The forewing has a narrow dark post-discal line and the outer edge of the basal ochreous area is bounded by a short broad black stripe; the hindwing is marked with small black spots and stripes.

A. lapithis is rather rare in lowland forest in Malaya proper and the Langkawi Islands. Abroad, the species ranges from Burma to Malaysia, and there is a further *Araotes* species in the Philippines.

Genus *Sithon* Hübner

In the single species of *Sithon*, the sexes are quite dissimilar on both wing surfaces. The male has an obscure brand about the origin of vein 7, a small tuft of black hairs in the costal half of the cell, and a rather large pecten of black hairs in and below the cell on the upperside of the hindwing; on the upperside of the forewing, about the mid-dorsum, is a similar, but smaller, black pecten, and, on the forewing beneath, there is a tuft of pale yellow hair overlying the rather extensive dorsal nacreous area.

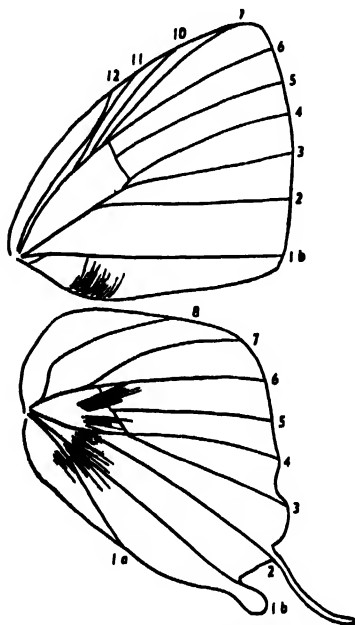


Fig. 136. *Sithon nedymond* ♂.
Venation.

Sithon nedymond nedymond (Cramer)

Plate 46, figure 200 ♂, 201 ♀

The Plush

In the male the wings above are deep lustrous blue, the forewing with rather regular black costal and distal borders, and both wings with the basal areas blackened. The underside is white with a broad chocolate-brown distal border, the inner half of which is more deeply coloured; the hindwing has the tornal area reddish orange, with the black spots overlaid with metallic green scales, and there is a short black subternal bar on the white ground.

The female is dark brown above, except for the faint bluish white tornal area with a somewhat obscure black spot in space 1b. The underside is orange, with the inner half of the hindwing whitened, and the narrow post-discal line becoming blacker towards the dorsum of both wings; the

hindwing has the usual black tornal spots crowned with metallic green.

The butterfly is rather uncommon in lowland forest in Malaya, it flies among bushes and shrubs at about three or four feet from the ground, and the sexes are found in approximately equal numbers. In the Langkawi subspecies *ismarus* Fruhstorfer, the female has the discal area on the upperside of the forewing paler and slightly reddish ochreous. Abroad, the species is distributed from Burma to Malaysia.

Subfamily LIPHYRINAE

The only known representatives of this subfamily, *Liphyra brassolis* Westwood and *L. castnia* Strand, are the largest and most primitive Lycaenids.

The adult has the antennae short (less than half the length of the forewing costa), with the very long club gradual and cylindrical, the eyes are large and smooth, and the third segment of the palpi is smooth, short and blunt. Legs rather short and stout, and the fore-legs perfect in both sexes; tarsal claws very short. Wings large and strong, and, in the male, the forewing has the termen produced at vein 4. The male is without secondary sexual characters, and the genitalia are not widely separated from those found in the Theclinae.

The early stages are remarkable and are described below under *L. brassolis abbreviata* Strand. *Liphyra* is entirely Indo-Australian in distribution.

Genus *Liphyra* Westwood

The characters of the genus are those of the subfamily Liphyrinae.

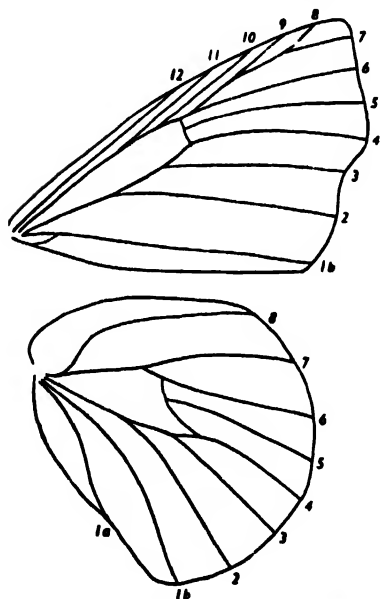


Fig. 137. *Liphyra brassolis* ♂. Venation.

Liphyra brassolis abbreviata Strand
Plate 48, figure 254 ♀; genitalia, Plate
17, figure 266

The Moth Butterfly

The wings are brownish orange, with black discal spots, and black distal borders on both wings. In the male, the black bordering is broader, almost the whole of the forewing except the basal halves of spaces 1a



(a)



(b)

Fig. 138. *Liphyra brassolis*.

(a) Ventral surface of larva. (b) Larval
shell cut to show pupa inside.

and 1b being black. The under surface is paler and browner, and with the markings obscure.

The butterfly is crepuscular in habit, and is said to be moth-like in flight. It is very rare on the forested plains in Malaya.

In Queensland, the eggs are laid on *Nauclea orientalis* (*Sarcocephalus cordata*), and, at least during the later stages, the larvae live in the nests of the tailor ant (*Oecophylla smaragdina* F.). The larva is smooth, elliptical, and nearly flat, and with a rim around the periphery so that the head, legs

anal claspers are beneath the rim and secure from attack by the ants. Pupation takes place in the ants' nest in the hardened larval skin, which serves as a strong outer covering for the pupa. The wings and thorax of the newly emerged adult are covered with loose white scales, and the abdomen is covered with buff-coloured filamentous scales, both of which are used as a protection against the ants, whose antennae, mandibles and legs are liable to become enmeshed in the scales when they come in contact with a butterfly. When the butterfly escapes from the nest, and the wings are dry, the white and buff outer scales become detached on the slightest movement of air.

L. brassolis is distributed from Sikkim through the Malay Archipelago to New Guinea and Australia, and, in the Indo-Malayan countries, it is always very rare.

FAMILY HESPERIIDAE

Skippers

The HesperIIDae differ so fundamentally from the other families of butterflies that some authors regard them as constituting a sub-order, to which the name *Grypocera* has been given.



Fig. 199. *Udaspes folus*. Fore-leg.

It is in the tropics that the HesperIIDae attain their maximum development and over 200 species are found in the Malay Peninsula. The similarity in facies, coupled with a great uniformity of structure, has led to their being neglected by collectors owing to difficulties of identification. They constitute a most interesting family, however, and offer much scope for original investigation. It cannot be denied that they are likely to prove troublesome to the amateur and, for this reason, we have dealt with the classification in some detail.

In the HesperIIDae the antennae are widely separated at the base and are generally curved or hooked at the apex. Eyes smooth. All three pairs of legs are well developed. Fore tibiae with a bluntly pointed appendage (the *tibial epiphysis*), usually densely scaled, on the inner edge. Hind tibiae usually with a medial as well as a terminal pair of spurs. Both wings with all veins arising from the wing base or from the cell, none being forked or coincident beyond the cell. On both wings, but especially on the hindwing, vein 5 may be faint or indicated only by a fold in the wing.

The wings are short in proportion to the stout body, and the butterflies are robust in build.

The prevailing colour of the wings is dark brown or ochreous, with

white or yellowish hyaline spots, which may be conjoined to form a hyaline band, and the markings on the upperside are usually confined to the forewing. Often, there is little or no difference in the wing pattern between allied species, and identification may be difficult or even impossible without examination of the genitalia. In general, only the male genitalia of the Oriental Hesperiidæ have been investigated (the study of the corresponding female genitalia would be an immense undertaking), so that absolute identification of some females may be impossible at present. The male genitalia are robust, usually the uncus is paired and tapering, the gnathos shows much diversity in form, and the valvae are, typically, broad and laminate. In many groups the ventral aspect of the uncus is of prime importance in identification.

The adults are strong on the wing, but the flight is short and not sustained. In some groups the butterflies are crepuscular. Many species are very rare in collections, and it is undoubtedly among the Hesperiidæ that most new discoveries of Malayan butterflies will be made.

The larvae are usually stout, and taper towards the extremities, they may be naked or with dispersed bristles, and the legs are short. The larval head is usually dark and contrasts with the rest of the body. In some species the larva is covered with a loose white filamentous material which may be rubbed off on handling. The larvae of many species live in the rolled-up leaves of the food plant and feed only at night. The larvae of the subfamily Hesperinae feed on monocotyledons, while those of the Coeliadinae and Pyrginae feed on dicotyledons.



Fig. 140. *Unkana ambasa*. Larva.



Fig. 141. *Unkana ambasa*. Pupa.

The pupa is long and without angular projections, and is usually enclosed in a shelter made by drawing together the leaves of the food plant. In some species the pupa is exposed and attached to a support by the anal extremity, or by a silken median girdle.

(Basic literature: Evans, 1949.)

Key for the separation of the Subfamilies of HESPERIIDAE

- 1 (4) Abdomen shorter than the hindwing dorsum. Forewing with the origin of vein 5 nearer vein 6 than vein 4 (fig. 143).
- 2 (3) Palpi third segment perfect, long, thin, naked and blunt at the apex (fig. 142). Hindwing lobate (fig. 143). *Coeliadinae* (p. 368)
- 3 Palpi third segment usually short stout and conical (fig. 145). Hindwing not markedly lobate (fig. 144). *Pyrginae* (p. 374)
- 4 Abdomen as long as, or longer than, the hindwing dorsum. Forewing with the origin of vein 5 not nearer vein 6 than vein 4 (fig. 147). *Hesperinae* (p. 382)

Subfamily COELIADINAE

Adults robust and large, or rather large, in size. Wings erect in repose. The butterflies are often crepuscular in habit.

The male is without a costal fold on the forewing, but in *Bibasis*, *Choaspes* and *Badamia* the hind tibiae have a hair tuft; in some species, particularly in *Hasora*, the forewing has a stigma or brand on the upper-side.

The larvae are brightly coloured, and, almost without exception, feed on dicotyledons.

The subfamily is found in the Ethiopian Region and throughout the Oriental Region. It is replaced by the subfamily Pyrrhopyginae in America.

Key for the separation of the genera of COELIADINAE

- 1 (4) Forewing cell shorter than the dorsum (fig. 143).
- 2 (3) Forewing vein 1b distorted at the base (fig. 143). Hindwing cilia not orange. ♀
forewing with hyaline spots. *Hasora*
- 3 Forewing with vein 1b gently sinuous at the base, and not distorted. Hindwing cilia orange (except in *B. gomata*). Forewing without hyaline spots. *Bibasis*
- 4 Forewing cell as long as, or longer than, the dorsum.
- 5 (6) Forewing cell equal in length to the dorsum. Underside green, with veins darkened and hindwing tornus orange. Forewing without hyaline spots. *Choaspes*
- 6 Forewing cell longer than the dorsum. Underside not as above. Forewing with hyaline spots. *Badamia*

Genus *Bibasis* Moore

Adults larger and with the forewing more quadrate than in *Hasora*. In the male the wings are brown or dark brown, with the tornal margin of the hindwing orange; in the female the basal areas of the wings are greenish blue, except in the rather aberrant *B. sena*. On the underside, there are pale streaks between the veins, except in *B. sena*.

The male has a large black circular brand in the basal half of the forewing above in *B. oedipodea* and *B. tuckeri*, and a similar, but smaller and more obscure brand in *B. jaina*. In all species there is present on the hind tibiae of the male a brown hair-pencil which is covered by shining white scales.

The larval food plants include *Combretum latifolium* (*B. oedipodea* and *B. sena*), *Zingiber zerumbet* (*B. harisa*) and *Schleffera lurida*, *Trevesia sundaica*, *Embelia garciniae-folia* and *Horsfieldia* (*B. gomata*).

Distributed from India and China, through Malaysia, to the Philippines, Celebes and the Lesser Sunda Islands.



Fig. 142. *Bibasis oedipodea*. Head. Showing third segment of palpi long, thin and porrect.

Key for the separation of the species of *BIBASIS*

- 1 (12) Underside hindwing with a black spot at the base of space 8, and without a white discal band.
- 2 (9) Upperside thorax clothed with long prominent greenish blue hairs.
- 3 (8) Forewing less than 28 mm. ♂ upperside forewing with a black basal brand.
- 4 (7) Underside forewing without a white spot near the apex of the cell.
- 5 (6) Underside hindwing with the tornal area broadly suffused with orange. *B. oedipodea*

- 6 Underside hindwing not suffused with orange, but with faint purple-white streaks between the veins. *B. tuckeri*
- 7 Underside forewing with a white spot near the apex of the cell. *B. jaina*
- 8 Forewing longer than 28 mm. ♂ upperside forewing without a brand. *B. etelka*
- 9 Upperside thorax with brown or greyish hair. ♂ upperside buff brown, with the veins conspicuously darkened. ♀ upperside steely blue, with the wing bases metallic greenish blue.
- 10 (11) Underside with rather faint orange streaks. *B. harisa*
- 11 Underside with pale greenish blue streaks. *B. gomata*
- 12 Underside hindwing with a broad white discal band, and without a black spot at the base of space 8. *B. sena*

***Bibasis harisa consobrina* (Plötz)**

Plate 47, figures 212 and 213 ♂

The Orange Awlet

With the possible exception of *B. sena*, all the *Bibasis* species are crepuscular, and are not on the wing until twilight is deepening to darkness. As far as our observations go, the butterflies remain on the wing for less than an hour, and probably take flight again just before dawn. They are mostly forest insects, and prefer the lower elevations. In our opinion, they are faster in flight than any other Malayan butterflies; they are more often heard than seen, owing to the dull "click" of the wings as they turn or change direction in flight.

B. harisa seems to be the least uncommon of the local species. The male is pale buff brown above, with the veins darkened; the forewing has a bright orange streak in the basal region of the costa, and the hindwing has orange tornal cilia. The female is deep steely blue above, with the basal halves of the wings shining metallic greenish blue. In both sexes the underside is shaded with orange, the hindwing particularly so. The head and the ventral surface of the thorax are orange, and there are a few orange hairs on the thorax above.

Larva dull bone-white, with dark dorsal stripes and spots; the head red with black dots. The food plant is *Zingiber zerumbet*.

B. harisa is to be found in clearings with low-growing vegetation near the forest edge. Outside Malaya it extends from Sikkim to Celebes.

A butterfly which may be confused with *B. harisa* is *B. etelka* (Hewitson), but this latter species is larger (forewing about 30 mm.), and in both sexes the thorax above is clothed with long greenish hair scales.

B. oedipodea oedipodea (Swainson) (Gesitalia, Plate 17, fig. 267) is of the size of *B. harisa*, but both sexes are dark brown above with the thorax and basal areas of the wings greenish blue. In the rather similar but much rarer *B. tuckeri* (Elwes & Edwards) the underside is streaked with pale purplish blue, and not with orange as in *B. oedipodea*.

B. sena uniformis Elwes & Edwards suggests an *Hasora* species in general appearance, but the hindwing cilia are orange. The underside is dark brown, with a broad shining white discal band on both wings. It is a forest butterfly with *Hasora*-like habits, and flies from Ceylon and India to Malaysia, the Philippines, Celebes and Lesser Sunda Islands.

Genus *Hasora* Moore

Adults of rather large size, with the forewing apex pointed and the hindwing markedly lobate. The wings are dark brown above, with pale hyaline spots on the forewing in the female; the underside is often washed with green or purple, and there may be a prominent pale transverse band on the hindwing.

The male has a discal stigma running from vein 1b to vein 4 on the upperside of the forewing in *H. mixta*, *H. taminatus*, *H. chromus* and *H. schoenherri*, while in *H. leucospila* and *H. khoda* the forewing above has glandular streaks along veins 1b, 2, 3 and 4.

The butterflies are swift in flight, most species are crepuscular, and some frequent the vicinity of caves.

The larvae are beautifully variegated and feed on such leguminous plants as *Pongamia* and *Milletia sericea*.

The genus is distributed from Ceylon, India and China through the Archipelago to Australia and the Fiji Islands.

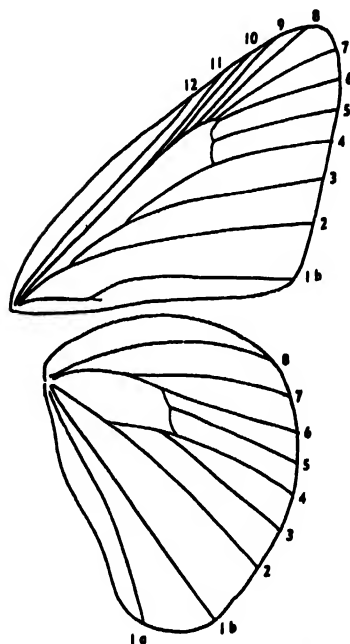


Fig. 143. *Hasora vitta* ♂. Venation.

Key for the separation of the species of *HASORA*

- 1 (4) Underside hindwing with a white spot in the cell.
- 2 (3) Underside hindwing cell spot small, less than half the width of the cell. ♂ upperside forewing with dense hairs on the disc suggesting a shadowy brand, and often with faint subapical spots. ♀ upperside forewing with three small subapical spots. *H. badra*
- 3 Underside hindwing cell spot much larger, more than half the width of the cell. ♂ upperside forewing without subapical spots. ♀ upperside forewing with not more than one subapical spot. *H. quadripunctata*
- 4 Underside hindwing without a white spot in the cell.
- 5 (16) Underside hindwing without a pale discal band.
- 6 (15) Underside hindwing not green.
- 7 (10) Underside prominently ochreous brown.
- 8 (9) Underside hindwing with a pale yellowish patch anterior to the blackened tornus. *H. mus*
- 9 Underside tornus not blackened. *H. myra*
- 10 Underside hindwing not prominently ochreous brown; may be brown, shaded with greyish brown, or purple-brown with lighter shading.
- 11 (14) Underside not purple-brown.
- 12 (13) Underside with a slight ochreous hue. Underside forewing dorsal area pale ochreous brown. Upperside with an ochreous hue. *H. lizetta*
- 13 Underside without an ochreous hue. Underside forewing dorsal area greyish brown. Upperside without an ochreous hue, except in the basal half of the hindwing in ♀. *H. zama*
- 14 Underside prominently purple-brown, with paler shading. *H. mixta*
- 15 Underside hindwing bluish green. *H. salanga*
- 16 Underside hindwing with a pale discal band.

- 17 (26) Underside hindwing discal band not yellow.
 18 (19) Underside hindwing purple-white discal band almost obsolete, but a white subternal spot present. *H. leucospila*
 19 Underside hindwing discal band prominent.
 20 (21) Underside hindwing brown, with a broad pure white discal band. *H. khoda*
 21 Underside hindwing glazed with green or purple.
 22 (23) Underside hindwing white discal band broad (nearly 2 mm.), and outwardly diffuse. Forewing with a white hyaline subapical dot in space 6. *H. vitta*
 23 Underside hindwing white discal band narrow (1 mm.). Forewing without a hyaline subapical dot (except in *H. chromus* ♀).
 24 (25) Underside hindwing discal band white and sharply defined. Upperside wing bases not paler than the rest of the wing. *H. laminatus*
 25 Underside hindwing discal band white, with a pale bluish sheen, and outwardly diffuse. Upperside wing bases conspicuously paler. *H. chromus*
 26 Underside hindwing with a broad yellow discal band. *H. schoenherri*

Hasora badra badra (Moore)

Plate 47, figure 209 ♀

The Common Awl

The wings are dark brown above, usually unmarked in the male (although faint subapical spots may be present), and with three pale yellowish subapical dots and rather large pale yellow hyaline spots in the cell and in spaces 2 and 3 on the forewing in the female. In the latter sex the wing bases are ochreous. The under surface is brown, with a purple glaze, and with a small white spot in the cell on the hindwing. The very similar *H. quadripunctata gnaeus* (Plötz) differs in the more pronounced purple hue on the underside, and in the much larger white cell spot on the hindwing. On the upperside of the forewing the male of *H. quadripunctata* is without subapical spots, while the female may have one or none. *H. badra* occurs throughout the Peninsula, in both primary and secondary growth, at all usual altitudes, but is never common. *H. quadripunctata* appears to be much rarer, and is known only from the forested lowlands.

The larva of *H. badra* has been reported feeding on *Derris elliptica*. Abroad, *H. badra* ranges from Ceylon, India and China through Malaysia to Celebes, while *H. quadripunctata* is restricted to Malaysia, Celebes and the Moluccas.

Hasora vitta vitta (Butler)

Plate 47, figure 210 ♀; genitalia, Plate 17, figure 268

The Plain Banded Awl

H. vitta is the commonest member of the Coeliadinae in Malaya, and, although not easily captured, it may be found in some abundance in the neighbourhood of hill-station bungalows at dawn and at twilight. The wings are dark brown above, the male with a single pale yellow subapical spot on the forewing, and the female with additional larger hyaline spots in spaces 2 and 3. The under surface is paler in colour, the inner half of the hindwing has a greenish glaze, and is separated from the brown outer half by a prominent white (or slightly bluish-

white) discal band, which is inwardly sharply defined and outwardly diffuse. The larvae are beautifully variegated and one food plant is *Pongamia glabra*, which grows near the sea-shore.

H. vitta is widely distributed, being found from India and west China, through the Archipelago, to New Guinea.

Species which are liable to be confused with *H. vitta* are *H. chromus* and *H. taminatus*. The commoner butterfly is *H. chromus chromus* (Cramer), in which the underside is rather pale purple-brown, with the white discal band on the hindwing narrow, outwardly diffuse, and with a pale bluish or purple sheen. The male is unmarked above, while the female has pale yellow crescentic spots in spaces 2 and 3 on the forewing. This is another widely distributed species, being found from India to Australia, the Bismarcks and Fiji Islands. *H. taminatus malayana* (C. & R. Felder) has the upperside unmarked in the male, and has small pale yellow spots in spaces 2 and 3 on the forewing in the female. The underside is bright coppery green in the costal half of the forewing and the basal two-thirds of the hindwing; the pure white discal band on the hindwing is sharply defined. Distributed from Ceylon and India, through the Archipelago, to the Moluccas and Waigiou.

In *H. salanga* (Plötz) the underside is green glazed, becoming purple towards the margins, and is without a discal band or other prominent markings; the upperside is dark brown, and the female has small white hyaline spots in the cell and in spaces 2 and 3 on the forewing. The species is found in the forested hills in Malaya, and its distribution is restricted to south Burma and Neomalaya.

Of the Malayan *Hasora* species with the underside brown and unmarked by a pale discal band, the montane butterflies *H. mus* and *H. lizetta* are the least rare. *H. mus pahanga* Evans is the smaller (forewing about 19 mm.); the brown upperside has an ochreous sheen, while the underside is uniformly ochreous brown, with a small yellow subternal patch above the black tornal spot. Both sexes are unmarked above. *H. mus* is found only near hill tops of from 4500 to 7000 feet, and flies in bright sunlight. *H. lizetta* (Plötz) is darker above and below, and has the outer half of the hindwing beneath distinctly paler. On the upperside of the forewing the female has pale yellow hyaline spots in the cell and in spaces 2 and 3, and the usual subapical dots. *H. mus* is confined to Neomalaya while *H. lizetta* has been found in Malaya, Sumatra and Java, but is absent apparently from Borneo.

Hasora schoenherri chuza (Hewitson)

Plate 47, figure 211, ♂

The Yellow Banded Awl

The beautiful *H. schoenherri* is the most ornate Malayan member of the genus. The wings are dark brown above, the forewing has four

rather large pale yellow subapical spots and the similarly coloured hyaline spots in the cell and in spaces 2 and 3 are united to form a confluent band. The hindwing has a broad yellow discal band. The underside is similar to the upperside, except that the wing bases are paler.

The butterfly is found in much the same situations as *H. vitta*, but is more local, and, like *H. vitta*, it is less frequently found on the plains. The species occurs from Assam and Burma, through Malaysia, to the Philippines.

Genus *Badamia* Moore

The wings are very elongate and the hindwing is caudate at vein 1b and strongly excavate between veins 1b and 2. In the male the hind tibiae have an erectile hair tuft fitting into a thoracic pouch.

B. exclamationis (Fabricius) occurs from Ceylon, India and China through the Archipelago to New Guinea, Australia, and as far east as Samoa. The upperside is brown, with greyish green scaling at the wing bases, and elongate whitish hyaline streaks in the cell (may be obsolete in the male), and in spaces 2 and 3 on the forewing; these spots are considerably larger in the female. The pale greyish brown underside has a glazed appearance, and the hindwing has a yellowish sub-tornal spot in space 1b above the blackened tornal area. The butterfly is day-flying, and frequents quarries and rocky localities in the forested lowlands.

The larva is yellowish green, with a dark dorsal line, and with broad and narrow dark transverse stripes; the yellowish-red head is marked with black.

Genus *Choaspes* Moore

Closely allied to the African genus *Coeliades* Hübner.

Butterflies rather large and robust. On the upperside, the head, thorax and at least the basal areas of the wings are bluish green, and the tornus of the hindwing is broadly yellow or orange.

In the male the hind tibiae have a long recumbent hair pencil enclosed by a comb of dark hairs, and there is an erectile tuft fitting into a thoracic pouch. In the male of *C. plateni* there are black glandular streaks along and between veins 1b, 2, 3 and 4 on the forewing and veins 2 to 4 on the hindwing.

The larvae are variegated, with a black-dotted head, and are known to feed on *Saba* and *Meliosma*. The genus is represented from India and China, through the Archipelago, to Papua. All the species are rare forest insects, and their identification may be difficult although the male genitalia show considerable specific differentiation (Plate 17, figs. 269–271). Of the Malayan representatives, *C. subcaudata crawfordi* (Distant) appears to be the most widely distributed.

Key for the separation of the species of *CHOASPES*

- 1 (4) Hindwing with a short pointed tail at vein 1b. Upperside hindwing tornal area yellow.
- 2 (3) Upperside hindwing black margin excavated at vein 2. *C. subcaudata*
- 3 Upperside hindwing black margin straight from vein 3 to space 1a. *C. plateni*
- 4 Hindwing with a blunt tooth at vein 1b. Upperside hindwing tornal area orange. Upperside hindwing black margin smoothly concave towards the termen between vein 3 and space 1a. *C. hemixanthus*

Subfamily PYRGINAE

Wings flat in repose. Only *Capila* crepuscular.

In the male, a costal fold may be present on the forewing in individuals of *Capila phanaeus*; there is no brand but hair pencils are often present on the hind tibiae.

The larvae are unicolorous green, brown or white, and, except in *Tagiades*, they feed on dicotyledons.

The subfamily is represented in all four regions.

Key for the separation of the Groups of Genera in the PYRGINAE

- 1 (2) Palpi second segment erect; third segment short, stout and conical and not (or only just) protruding beyond the hair scales. *Celaenorrhinus* group
- 2 Palpi second segment more or less porrect; third segment usually long and protruding beyond the hair scales (fig. 145). *Tagiades* group

Celaenorrhinus Group of Genera

The group is more strongly represented in America than in the Old World.

Key for the separation of the Genera of the *CELAENORRHINUS* Group

- 1 (2) Antennal apiculus nearly 3 mm. in length. Palpi third segment just protruding. Forewing longer than 25 mm. *Capila*
- 2 Antennal apiculus 2 mm. or less. Palpi third segment not protruding beyond the hair scales. Forewing less than 25 mm.
- 3 (4) Forewing with the origin of vein 4 much nearer vein 5 than vein 3. Wings black, forewing with an elliptical white band with a bluish reflection and no subapical spots. *Charmion*
- 4 Forewing usually with the origin of vein 4 midway between veins 3 and 5 (fig. 144). Wings brown, forewing with a white, yellow or orange-yellow fascia composed of confluent or detached spots. *Celaenorrhinus*

Genus *Capila* Moore

The male of *C. phanaeus* has the hind tibiae tufted, and, in Assam and Burma, there is a costal fold on the forewing which is absent in Sumatra and Borneo. The costal fold is usually but not invariably present in Malaya.

Life history unknown. Distributed from India and China to Malaysia.

C. phanaeus ferrea Evans is confined to the plains, and occurs also in the Langkawi Islands. *C. pieridoides sofa* Evans is rare throughout its range, which extends from Assam to China and Borneo. Of this species Hartert wrote "The scent of this beautiful insect excels every perfume known to me in loveliness, distantly resembling the well-known scent of blossoms of heliotrope."

Key for the separation of the species of CAPILA

- 1 (2) Eyes red. Upperside deep orange-brown, with the hyaline spot at the cell-end on the forewing not extended above the cell. *C. phaeonius*
- 2 Eyes black, ♂ upperside white, forewing with the apical area black, and the hindwing with a series of black post-discal spots. ♀ upperside brown, with the hyaline spot at the cell-end on the forewing extended (non-hyaline) to the costa. *C. pieroides*

Genus *Charmion* Nicéville

The butterflies resemble the much commoner *Notocrypta* species, but the forewing is without apical dots. In the male the hind tibia has a tuft of hairs.

The genus occurs from Burma, through Malaysia, to the Moluccas, and the Malayan representative, *C. ficulnea queda* (Plötz) is found on the forested plains and foothills. The female has the white band on the forewing longer and with the sides more nearly parallel. The palpi are brown below and orange at the sides.

Genus *Celaenorrhinus* Hübner

This widespread genus is represented in America, Africa and in the Oriental Region from India and China to Celebes. The male hind tibiae have a tuft of brown hairs, except in *C. aurivittata*.

The green larvae have been described as comparatively stout, with a short neck and a lustrous black head. The food plant of *C. asmara* is *Clerodendron fragrans*.

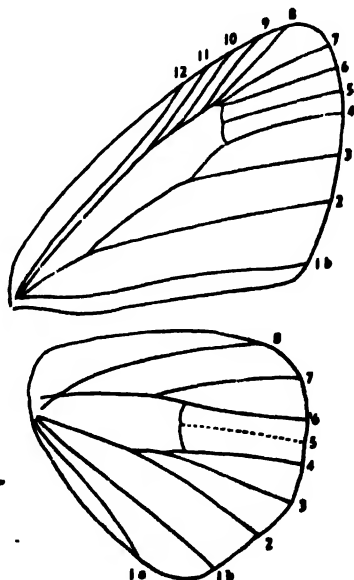


Fig. 144. *Celaenorrhinus aurivittata* ♂. Venation.

Key for the separation of the species of CELAENORRHINUS

- 1 (4) Upperside forewing discal band white.
- 2 (3) Upperside forewing with one or two white hyaline spots in space 1b. *C. putra*
- 3 Upperside forewing without hyaline spots in space 1b. *C. asmara*
- 4 Upperside forewing discal band yellow or orange-yellow.
- 5 (8) Forewing band not extending beyond the origin of vein 4. Upperside forewing with subapical spots.
- 6 (7) Forewing with the inner edge of the discal band more or less evenly curved. Underside hindwing without yellow dashes. *C. aurivittata*
- 7 Forewing with the inner edge of the discal band strongly excavated along veins 2 and 4. Underside hindwing with a few yellow dashes. *C. inaequalis*
- 8 Forewing band extending well beyond the origin of vein 4. Upperside forewing without subapical spots. *C. ladana*

Celaenorrhinus surivittata cameroni (Distant)

Plate 47, figure 214 ♂; genitalia, Plate 17, figure 272

The Dark Yellow-banded Flat

The wings are chocolate-brown, and the forewing has a yellow (not red or orange-red) discal band, extending from the mid-costa to the tornus; there are three minute subapical spots which may be separated or conjoined. The butterfly occurs at all usual elevations throughout the Peninsula; it is not uncommon in fairly open forest, but is rather local. The butterfly settles with the wings outspread, usually on the underside of a leaf. The species occurs from Assam and China to Neomalaya.

In the closely allied but much scarcer *C. ladana* (Butler), the oblique yellow band on the forewing is broader, and there are no subapical spots. The species is confined to primary forest at low elevations in Malaya proper, and otherwise is known only from Borneo.

The only other Malayan species of *Celaenorrhinus* likely to be met with is *C. asmara asmara* (Butler), which is uncommon, but widely distributed in Kedawi and the lowlands of Malaya proper. In this butterfly the forewing discal fascia is white and abbreviated and does not extend below vein 2, and the usual subapical dots are present.

Tagiades Group of Genera

In many cases the structural differences between genera are not readily apparent and, for purposes of identification, it is easier to rely on the distinct differences in facies. In most species in the group the female has an anal tuft on the abdomen.

Key for the separation of the Genera of the TAGIADES Group

- 1 (20) Forewing apex not truncate. Hindwing not angled (except in *Darpa*, where it is slightly excavate above vein 4, and *Coladema palawana*, which is angled at vein 4).
- 2 (17) Hindwing not bright orange.
- 3 (8) Upperside hindwing tornal area white or yellowish to the distal margin.
- 4 (5) Upperside hindwing tornal area pale yellow. *Mooreana*
- 5 Upperside hindwing tornal area not yellow.
- 6 (7) Hindwing with black wedge-shaped discal spots. Hindwing slightly excavate above vein 4. *Darpa*
- 7 Hindwing without such spots. Hindwing slightly excavate above vein 4 in some species. *Tagiades*
- 8 Upperside hindwing tornal area not whitish to the distal margin.
- 9 (14) Upperside hindwing broadly whitened, or with a white median band.
- 10 (11) Forewing without a hyaline cell-spot. Palpi white beneath. *Seseria*
- 11 Forewing with a hyaline cell-spot. Palpi yellow beneath.
- 12 (13) Forewing cell-end spot much nearer the base than is the spot in space 2. Forewing longer than 23 mm. *Satarupa*
- 13 Forewing cell-end spot above the spot in space 2. Forewing less than 23 mm. *Daimio*
- 14 Upperside hindwing without a white area and with dark, obscure spots.
- 15 (16) Upperside forewing with pale hyaline spots, usually forming a discal fascia. *Coladema*
- 16 Upperside forewing with a few hyaline dots, and without a hyaline band or fascia. *Sarangusa*
- 17 Hindwing bright orange.
- 18 (19) Both wings orange, with a network of black bars. *Odina*
- 19 Forewing black, with white hyaline spots. *Pinlara*
- 20 Forewing truncate from vein 4 to the apex. Hindwing angled at vein 3 or 4.

- 21 (22) Hindwing dentate at vein 3. Upperside hindwing with one or more white hyaline spots and without white lines. *Tapena*
- 22 Hindwing dentate at vein 7, and excavate between veins 4 and 7. Upperside hindwing with white lines and without hyaline spots. *Odontoptilus*

Genus *Tapena* Moore

Male hind tibiae with a hair tuft. There is a single species distributed from Ceylon and India to Neomalaya, and the Malayan representative is *T. thwaitesi bornea* Evans. The upperside is dark reddish brown; the forewing with three rather large subapical spots and minute hyaline spots in spaces 10 and 11 above the cell, and the hindwing with a small white hyaline spot near the cell-end.

T. thwaitesi is rare on the forested plains.

Genus *Darpa* Moore

The butterflies somewhat resemble species of *Tagiades*. The tornal cilia on the hindwing are elongate, especially in the male. The upperside is dark brown, and the hindwing has the tornal area broadly whitened and a prominent discal series of black cuneiform spots. The forewing has small white hyaline spots in the subapical area, in the cell and, usually, in spaces 2, 3, 4 and 5.

Distributed from Assam to Malaysia and the Philippines. Both the Malayan species are rare forest insects, *D. pteria dealbata* (Distant) preferring the hills, while *D. striata striata* (H. Druce) is found on the plains.

Key for the separation of the species of *DARPA*

- | | | |
|---|--|-------------------|
| 1 | (2) Hindwing with black marginal spots on the white tornal area. | <i>D. striata</i> |
| 2 | Hindwing without black marginal spots on the white tornal area. | <i>D. pteria</i> |

Genus *Odina* Mabille

Distributed from Assam and Burma, through Neomalaya, to the Philippines and Celebes.

The sole Malayan representative of the genus is *O. hieroglyphica ortina* Evans, which is rare in lowland primary forest.

Genus *Sarangesa* Moore

Hind tibiae with a hair tuft in the male. The genus is found in Africa and India and extends to west China. *Sarangesa dasahara* (Moore), the only species to reach Malaya has not yet spread beyond the Langkawi Islands and Perlis. It occurs in the typical subspecies in which the upperside is a dark, rather reddish brown with obscure dark fasciae. The forewing has the usual hyaline subapical dots, one or two very small hyaline spots in the cell, and a similar spot in space 11 above; usually, there is a hyaline dot in space 3, and, sometimes, in space 2 also. The paler underside has a slightly golden sheen. Distributed from Ceylon and India to Kedawi.

Genus *Coladenia* Moore

Hind tibia with a hair tuft in the male. The genus is represented in Africa, and from India and China through Malaysia to the Philippines and Celebes. In the Peninsula, all the species are very rare except *C. dan*. *C. palawana* is remarkable for the angled hindwing.

Key for the separation of the species of *COLADENIA*

- 1 (2) Underside forewing without white post-discal spots in space 1b. Upperside dark reddish brown. *C. dan*
- 2 Underside forewing with two white post-discal spots in space 1b. Upperside brown ; only slightly ochreous in *C. agni*.
- 3 (4) Upperside and underside hindwing without a dark sub-basal spot in space 1b. Upperside forewing without a dark spot near the middle of space 1b. *C. agni*
- 4 Upperside hindwing, and usually underside hindwing, with a dark sub-basal spot in space 1b. Upperside forewing with a dark spot near the middle of space 1b.
- 5 (6) Hindwing evenly rounded. *C. laxmi*
- 6 Hindwing angled at vein 4. *C. palawana*

Coladenia dan dhyana Fruhstorfer

Plate 47, figure 216 ♂

The Fulvous Pied Flat

Above and below the wings are reddish brown. The forewing has a pale yellow hyaline spot at the end of the cell (large and irregular in the female), a small spot above it in space 11, spots in spaces 2 and 3, and the usual three minute subapical dots. The forewing has a dark submarginal fascia, and the hindwing is traversed by irregular lines composed of dark, diffuse spots.

C. dan is widely distributed on the Malayan lowlands, but is never abundant ; it is usually taken at *Mimosa pudica* at the forest edge. The larva is green, with lighter sides, and a shiny black head. It has been found on *Achyranthes aspera* in Celebes.

Distributed from south India to China, and through Malaysia to Celebes and Lesser Sunda Islands.

Genus *Satarupa* Moore

Forewing with the apex acute. In both this and the following genus, the hindwing cell is entirely white on the underside, although, in *Satarupa*, it may be blue-dusted near the base. Hind tibiae with a hair tuft in the male.

The wings are black or blackish brown, with hyaline spots on the forewing, and the hindwing is broadly whitened from vein 8 to the inner margin and has a prominent series of black sub-marginal spots. The genus is distributed from India and China to Sumatra.

S. gopala malaya Evans, the sole Malayan representative, has a forewing length of nearly 25 mm. It is rare, and frequents exposed hill-tops at altitudes above 3,000 feet.

Genus *Seseria* Matsumura

The genus is distributed from Sikkim to China, Formosa and Malaysia, and the butterflies closely resemble those of the preceding genus, although always smaller. The single Malayan species, *S. affinis kirmana* (Plötz), is rare on the forested lowlands, and is Malaysian in distribution.

Genus *Pintara* Evans

In this remarkable genus, which is found from Burma to China and Neomalaya, the forewing above is black, with a steely blue sheen and a post-discal fascia of separated white hyaline spots. The bright orange hindwing has a black border, and a few scattered black spots. In the male, the hind tibia has a hair tuft. *P. pinwilli pinwilli* (Butler) has not been found in the Peninsula since the type specimen was taken by Pinwill over seventy years ago.

Genus *Daimio* Murray

The butterflies bear a general resemblance to those of the genus *Satarupa*. Hind tibia with a hair tuft in the male. The upperside is brown, with white hyaline spots on the forewing and a broad white discal area on the hindwing. In the forms found in Malaya, the hindwing is without dark submarginal spots. The genus is distributed throughout the Oriental Region, except Ceylon and south India.

The two Malayan species, *D. sinica minima* Swinhoe and *D. limax dirae* Nicéville are confined to lowland forest, and are extremely rare.

Key for the separation of the species of *DAIMIO*

- 1 (2) Upperside forewing with a small cell spot on the lower margin of the cell over the centre of the spot in space 2. Underside forewing without a white spot in space 1b between the wing margin and the white spot immediately below the hyaline spot in space 2. *D. sinica*
- 2 Upperside forewing with a narrow oblique cell spot extending from the upper to the lower margin and directed between the spots in spaces 2 and 3. Underside forewing with two white submarginal spots in space 1b between the wing margin and the white spot immediately below the hyaline spot in space 2. *D. limax*

Genus *Mooreana* Evans

In the male both the mid- and hind-tibiae bear a hair tuft. The genus occurs from India to Malaysia and the Philippines. In general appearance, *M. trichoneura trichoneura* (C. and R. Felder) suggests a species of *Tagiades*. The upperside is dark brown, the forewing has a number of white hyaline spots and streaks in the outer half of the wing, and the hindwing has a series of black wedge-shaped discal spots and the tornal area is pale yellow; the underside of the hindwing is predominantly pale yellowish white. The butterfly is rare on the forested plains in Malaya.

Genus *Tagiades* Hübner

Wings dark brown with small white hyaline spots on the forewing, and, except in *T. japetus*, with the tornal area of the hindwing broadly

whitened; usually, the hindwing has a series of black marginal spots. Species with similar facies can be readily separated by aid of the male genitalia (Plates 17 and 18, figs. 273-276).

The genus is represented in Africa, and is widely distributed throughout the Indo-Australian Region.

The larvae are green, rather stout, and have been found feeding on species of *Roxburghiaceae*, *Dioscoreaceae* and *Convolvulaceae*.

(Basic literature: van Regteren Altena, 1944.)



Fig. 145. *Tagiades gana*. Head. Showing third segment of palpi porrect and protruding.

Key for the separation of the species of TAGIADES

- 1 (8) Upperside forewing without a white spot in space 11 above the cell spot.
- 2 (3) Upperside hindwing without dark post-discal spots.
T. lavata (16.0-18.5 mm.)
- 3 Upperside hindwing with at least traces of dark post-discal spots.
- 4 (7) Upperside hindwing with a broad white tornal area.
- 5 (6) Upperside hindwing with the dark spot in space 6 midway between the termen and the origin of vein 7.
T. gana (20.0-23.0 mm.)
- 6 Upperside hindwing with the dark spot in space 6 nearer the termen than the origin of vein 7.
T. parva (24.0 mm.)
- 7 Upperside hindwing without a white tornal area.
T. japaetus (18.5-22.5 mm.)
- 8 Upperside forewing with a white hyaline spot in space 11 above the cell-end spot.
- 9 (20) Upperside hindwing with a prominent black marginal spot on vein 1b.
- 10 (13) This spot distinctly larger than the other black marginal spots.
- 11 (12) Upperside hindwing white area restricted and not extending above vein 4.
T. toba (16.5 mm.)
- 12 Upperside hindwing white area above vein 4, and usually to vein 6 on the disc.
T. waterstradti (16.0 mm.)
- 13 Upperside hindwing black marginal spot on vein 1b hardly larger than the other spots.
- 14 (17) Upperside hindwing with a black post-discal spot on the white area in space 1b.
- 15 (16) Upperside forewing, usually with a white hyaline post-discal dot in space 3. Abdomen with anal portion white, tending to be striped in ♀.
T. menaka (21.0-23.0 mm.)
- 16 Upperside forewing without a white hyaline dot in space 3. Abdomen narrowly striped with white.
T. cohaerens (19.0-20.5 mm.)
- 17 Upperside hindwing without a black post-discal spot on the white area in space 1b.
- 18 (19) Upperside forewing, usually with a white hyaline post-discal dot in space 3.
T. litigiosa (18.0 mm.)
- 19 Upperside forewing without a white hyaline post-discal dot in space 3.
T. ultra (17.5-19.0 mm.)
- 20 Upperside hindwing without a black marginal spot on vein 1b.
T. calligana (17.0-19.0 mm.)

Tagiades gana gana (Moore)

Plate 47, figure 215 ♂

The Large Snow Flat

T. gana is one of the commonest representatives of the genus in Malaya, and is found throughout the Peninsula, in both primary and secondary forest, at moderate elevations. Above, the wings are dark brown, with rather obscure dark discal and post-discal spots. The forewing has three white hyaline subapical dots, and the tornal area of the hindwing is whitened and has black diffuse spots at the end of veins 2, 3 and 4; the black spot in space 6 on both surfaces of the hindwing is situated midway between the base of this area and the

termen. The larva feeds on *Dioscorea glabra*. The species is distributed from India to Indo-China, Malaysia and the Philippines.

The similar *T. parva naxos* Evans, which occurs in various races from Sikkim to Malaysia, differs in that the black spot in space 6 on the hindwing is nearer the margin.

The widely distributed *T. jabethus* is represented in Malaya by *T. jabethus atticus* (Fabricius) (see Plate II, figure 7). In the usual form in Malaya proper, the underside of the hindwing is pale buff brown but, often in both sexes in the north and in the female in Malaya proper, individuals may approach the Indian and Burmese subspecies *ravi* (Moore) in which the hindwing beneath is generously suffused with bluish white scaling. The species ranges from Ceylon and India through the Archipelago to the Solomon Islands.

The smallest of the less rare *Tagiades* species is *T. lavata* Butler (forewing 16–18.5 mm.), which is unmarked above except for the hyaline subapical dots on the forewing, and a narrow white tornal area on the hindwing which bears small obscure black dots at the vein endings. The species is Malaysian in distribution, and is found in primary forest at the usual elevations.

T. cohaerens cinda Evans, has, on the forewing, hyaline dots in spaces 4 to 8 and 11, and a hyaline spot at the cell-end. On the hindwing, the whitened area extends to vein 6 or above it, the black marginal spots are rather large, and there is a black post-discal submarginal spot, which may be obscure, in space 1b. It may be difficult to separate *cinda* from *T. menaka manis* Evans with certainty without having recourse to an examination of the male genitalia. Both species are confined to the forested hills.

T. litigiosa and *T. ultra* are similar to *T. cohaerens* and *T. menaka*, but lack the black post-discal spot on the white area in space 1b. *T. litigiosa litigiosa* Möschler has a hyaline dot in space 3 on the forewing which is usually absent in *T. ultra ultra* Evans, but the two can be separated with certainty by examination of the male genitalia. In Malaya, *T. litigiosa* is known only from Kedawi, where it is very rare, but *T. ultra* is of more frequent occurrence in the forested lowlands of Malaya proper.

All the *Tagiades* are sun-loving butterflies, which are usually found among tall shrubs and trees at the forest edge. They fly so rapidly that only the whitened area of the hindwings may betray their presence; they settle on the edge of a leaf with wings fully outspread, but, so often, the perch chosen is out of reach of the collector's net.

Genus *Odonoptilum* Nicéville

Differs from all other genera in the *Tagiades* group in that the antennal apiculus is blunt and not tapered to a fine point. Hindwing with the tornal cilia elongate. The male with a short dense tuft of white

hairs on the fore coxae, and the female with a thick anal tuft on the abdomen.

Distributed throughout the Oriental Region, except Ceylon and south India.

Key for the separation of the species of *ODONTOPTILUM*

- 1 (2) Upperside forewing without white lines. Upperside hindwing tornal area not white. *O. angulata*
- 2 Upperside forewing with narrow white lines. Upperside hindwing tornal area broadly whitened. *O. pygela*

Odontoptilum pygela pygela (Hewitson)

Plate 47, figure 217 ♂

The Banded Angle

The wings are dark reddish brown and traversed by two white lines, of which the outer is very irregular ; the hindwing termen is broadly suffused with white. On the underside, the hindwing is almost entirely white, with dark brown spots in the costal area, and two black sub-marginal spots in space 1b. The hindwing cilia are long and prominent, and the termen is deeply excavated between veins 4 and 7.

The butterfly flies in bright sunshine in open spaces in forest land, and may be taken visiting flowers. The species is distributed from Burma to Malaysia.

The second Malayan species extends from India and China to Malaysia. *O. angulata mahabini* Fruhstorfer is chestnut-brown above, and is without white lines on the forewing which, however, has a crescentic hyaline spot in space 2, and a smaller spot above it near the base of space 3. The hindwing is without the whitish suffusion found in *O. pygela*. The larva of *O. angulata* has been described as pale ochreous brown (yellowish green in the early stages), clothed with yellowish red hair, and with the head dark brown. The food plants include *Hibiscus tiliaceus*, *Urena lobata* and *Ceiba*. The pupa is milky white.

Both species appear to be restricted to the plains in the Peninsula.

Subfamily HESPERIINAE

Wings erect in repose. Diurnal. In certain species the male has some form of discal brand or stigma on the forewing above ; there is no costal fold on the forewing nor hair tuft on the hind tibiae.

The larvae are yellowish, whitish or green, and, with the exception of *Cupitha purreea*, all feed on monocotyledons.

The subfamily is represented in all four regions.

In the following species of Hesperinae, one or both sexes have both wing surfaces a uniform, unmarked, dark brown, and without yellow or orange tornal cilia on the hindwing : *Astictopterus jama*, *Iambrix distanti*, *Koruthaialos butleri*, *Sancus fuligo*, *Ancistroides nigrita*, *Hyarotis iadera*, *Quedara monteithi* ♂ and *Ge geta* ♂. Of these, the only common species

are *A. nigrita* (of comparatively large size, forewing about 21 to 23 mm., and with the outer areas broadly paler on the underside of both wings), *S. fuligo* (with obscure ferruginous spots on the underside), and *A. jama* (sometimes with two or three white hyaline subapical dots on the forewing).

Key for the separation of the Groups of Genera in the HESPERIINAE

- 1 (6) Antennal club not constricted before the apiculus (fig. 148). Forewing vein 5 usually straight at its origin. Hindwing vein 5 well defined.
- 2 (3) Palpi second segment porrect (fig. 146) but tending to be more erect and flattened in *Halpe*. Hindwing cell not longer than half the length of the wing. *Astictopterus* group (p. 383)
- 3 Palpi second segment erect (fig. 148).
- 4 (5) Hindwing vein 5 straight, and usually downcurved at its origin (fig. 152) (except in *Ancistroides fulgur*). Antennal apiculus finely pointed. *Ancistroides* group (p. 384)
- 5 Hindwing vein 5 usually present and oblique and not downcurved at its origin (fig. 155) (except in *Purdana*). *Platystrophia* group (p. 398)
- 6 Antennal club constricted before the apiculus (but the apiculus absent in *Taractroceras*). Forewing vein 5 usually downcurved at its origin. Hindwing vein 5 usually obsolete.
- 7 (8) Mid tibiae smooth. Wings with yellow markings. *Taractroceras* group (p. 417)
- 8 Mid tibiae spined (fig. 158) or smooth. Wings brown and usually with small hyaline spots. *Pelopidas* group (p. 424)

Astictopterus Group of Genera

In the genera other than *Pithauria* and *Halpe*, the abdomen is longer than the hindwing dorsum. On the upperside, the wings are reddish brown, unmarked or almost so, except in *Ampittia* (with yellow or yellowish spots on both wings), and *Pithauria* and *Halpe* (both with whitish hyaline spots on the forewing). In the genera mentioned, the hindwing cell is about two-fifths the wing length, and, in these genera, secondary sexual characters are present in the male.

Key for the separation of the Genera of the *ASTICTOPTERUS* Group

- 1 (4) Forewing with the origin of vein 2 before the origin of vein 11 (fig. 147). Palpi second segment long and porrect (fig. 146). Underside forewing without a series of pale yellowish post-discal or submarginal spots.
- 2 (3) Forewing with vein 11 nearer vein 12 than vein 10 (fig. 147). Wings unmarked except for forewing subapical dots present in individuals. *Astictopterus*
- 3 Forewing with vein 11 midway between veins 12 and 10. Underside forewing with an orange subapical spot. *Armetta*
- 4 Forewing with the origin of vein 2 beyond or opposite the origin of vein 11. Underside forewing with small, pale yellowish, diffuse, non-hyaline, and sometimes obscure, post-discal or submarginal spots, increasing in intensity towards the costa (not traceable in *Ampittia*).
- 5 (8) Wings comparatively broad, and the forewing costa more or less arched. Forewing without whitish hyaline spots in spaces 2 and 3 (except in ♀ *Ampittia*).
- 6 (7) Hindwing cell about 2/5 the length of the wing. Upperside with prominent orange-yellow markings, paler in the female. *Ampittia*
- 7 Hindwing cell half the length of the wing. Underside with submarginal and post-discal fasciae on both wings, but these markings may be obscure. *Aeromachus*
- 8 Forewing costa straight, and the forewing apex and hindwing tornus more produced. Forewing with whitish hyaline spots in spaces 2 and 3 (except in *Halpe hians*).
- 9 (10) Antennal apiculus not longer than twice the width of the club. Forewing less than 16 mm. *Halpe*
- 10 Antennal apiculus very long and thin, as long as three times the width of the club. ♂ with wing bases overlaid with conspicuously paler scaling and hairs. Forewing longer than 17 mm. *Pithauria*

Genus *Astictopterus* C. and R. Felder

The genus is represented in tropical Africa and from India to China, Malaya, Sumatra and Java. A single Malaysian species.



Fig. 146. *Astictopterus jama*. Head. Showing second segment of palpi porrect.

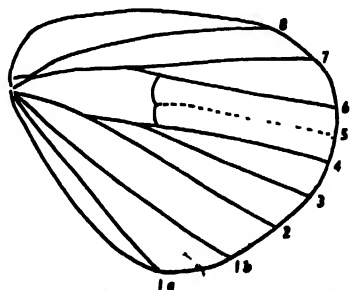
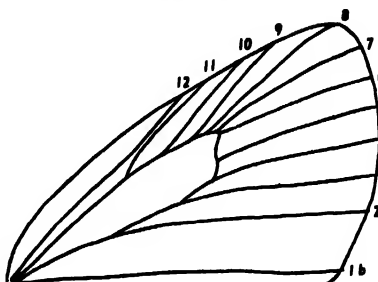


Fig. 147. *Astictopterus jama* ♂. Venation.

Astictopterus jama jama (C. and R. Felder)

Plate 47, figure 218 ♀; genitalia, Plate 18, figure 277

The Forest Hopper

Above and below the butterfly is dark brown, and is usually unmarked although there may be present two or three white hyaline subapical dots on the forewing. The forewing length is 16 to 17 mm., and the sexes are alike. The unicolorous underside differentiates this species from the superficially similar *Sancus fuligo* (p. 393).

A. jama is widely distributed in the Peninsula in primary and secondary forest at lower elevations. It is quite common, and flies in the sunshine. The species is distributed from Sikkim to China and to Malaya, Sumatra and Java.

Genus *Arnetta* Watson

The somewhat heterogeneous elements which comprise this genus are found in Madagascar, and from India to Burma, Indo-China and Neomalaya.

A single Malayan species.

Arnetta verones (Hewitson)

Plate 47, figure 220 ♂

The Sumatran Bob

The wings above are dark brown, with a slight golden huc, and unmarked. The underside is dark brown, the forewing with an oval

orange spot near the apex, and the hindwing sparsely dusted with ferruginous scales. Forewing length about 13 mm.

The butterfly is found in wooded localities on the plains in Kedawi and Malaya proper, and is not rare. The species is confined to Peninsular Siam and Neomalaya.

Genus *Aeromachus* Nicéville

The wings are dark brown above, with a golden sheen, and, of the Malayan species, *A. jhora* has a post-discal series of obscure whitish dots on the forewing. On the underside, the apical area of the forewing and the whole of the hindwing are dusted with greenish scaling; the indistinct markings in all the species comprise submarginal, post-discal and discal (hindwing only) series of pale spots. The sexes are alike, but, in *A. jhora* and *A. dubius*, the male has a very small whitish streak over the middle of vein 1b on the forewing above.

The genus is represented from Sikkim to China, Malaya, Sumatra, Java and the Philippines.

All the species are decidedly scarce in Malaya. *A. pygmaeus* (Fabricius) has been taken in open country in the plains in Kedah, while *A. dubius javanicus* Elwes and Edwards and *A. jhora creta* Evans are confined to the forested hills.

A. pygmaeus does not occur south of Kedawi, *A. jhora* has a representative in the Battak Mountains in Sumatra, while *A. dubius* is known from Java and Hainan, but otherwise does not leave the Asiatic mainland.

For figures of genitalia, see Plate 18, figs. 278–280.

(Basic literature: Evans, 1943*b*.)

Key for the separation of the species of *AEROMACHUS*

- 1 (4) Antennae with the tip pointed. Forewing 11 mm. or above.
- 2 (3) Antennae with a well defined apiculus, beginning from well beyond the thickest part of the club, and, usually, at right angles to the club. Upperside forewing with a post-discal series of obscure whitish spots. *A. jhora* (11.5–12.0 mm.)
- 3 Antennae with apiculus beginning at the thickest part of the club, and not at right angles to the club. Upperside almost unmarked. *A. dubius* (11.5 mm.)
- 4 Antennae with the tip blunt, the club straight and without a well defined apiculus. Antennae short, less than half the length of the forewing. Forewing 10 mm. or less. *A. pygmaeus* (9.0–9.5 mm.)

Genus *Ampittia* Moore

Small butterflies with the males bearing some resemblance to species of *Potanthus*, although closer examination shows the pattern to be different.

In the male of *A. dioscorides*, the only Malayan representative, the upperside of the forewing has a dark band extending from the middle of vein 1b to the base of space 2, and, on the hindwing, veins 6 and 7 are "hair-pinned."

The genus occurs in tropical Africa, Palaearctic China and from Ceylon and India to Malaysia.

Ampittia dioscorides camertes* (Hewitson)Plate 47, figure 219 ♂***The Bush Hopper**

In the male the upperside is dark brown with orange-yellow markings ; these markings comprise, on the forewing, a broad stripe in the cell and costal area, post-discal spots in spaces 1b, 2 and 3 (the two latter spots contiguous), and conjoined subapical spots in spaces 6 to 8, and, on the hindwing, a post-discal fascia of elongate spots in spaces 2 to 5. In the rarer female, the upperside markings are paler and much reduced, the basal marking on the forewing being restricted to a small spot at the end of the cell.

In both sexes the underside is marked much as above, but the hindwing is heavily dusted with yellow scaling and has additional orange-yellow spots and streaks. In the female the underside is darker, and the spotting smaller. Forewing length 10 to 11 mm.

The larva is green, with a dark head, and feeds on species of grasses including rice. The butterfly is not uncommon along forest roads at moderate elevations, and is rather local in distribution.

The species occurs from Ceylon and India to south China and Malaysia.

Genus *Halpe* Moore

A large genus comprising rather a diverse collection of species, although some are so similar that they can only be separated satisfactorily by examination of the male genitalia.

The wings are dark brown above, with whitish hyaline markings, these normally comprising up to two cell spots, post-discal spots in spaces 2 and 3, and small subapical spots in spaces 6 to 8 on the forewing; the hindwing is unmarked. Beneath, the wings are brown, with the costa and apex of the forewing and the whole of the hindwing overlaid with paler scales. In addition to the hyaline spotting, the forewing (and usually the hindwing also) has a narrow submarginal band composed of small pale yellowish diffuse spots and the hindwing a broad pale discal fascia, sometimes obscure, and often comprising interneural streaks and spots.

In all the Malayan species except *H. hueron*, there is present on the forewing in the male a thick raised sex stripe from the mid-dorsum to the base of space 2. But in *H. auriferus* this stripe is absent in individuals, and, in the unlikely event of these forms proving distinct species, the unbranded butterfly would be known as *H. auriferus* while the name *toxopea* would be reserved for the branded form. In all the *Halpe* males with a sex stripe on the forewing, the hindwing has veins 6 and 7 "hair-pinned" at their origins. The male genitalia are highly characteristic, the uncus bilobate, the gnathos comprising a pair of stout hooks, and the valvae narrow and tapering with the inner edge irregular and furnished with spines.

The green larva of a single species, *H. homolea* (Hewitson), is known, and feeds on bamboo, and pupates between the leaves.

The genus is represented in China and throughout the Oriental Region. Many of the species are confined to the Asiatic mainland, and most of the Malayan species are extremely rare and known only from one or two examples.

Key for the separation of the species of HALPE

- 1 (8) Antennae white-banded above before the apiculus.
 - 2 (3) Underside forewing with two cell spots, the lower one moved towards the base.
H. insignis (15.0-16.0 mm.)
 - 3 Underside forewing with a single cell spot or none.
 - 4 (5) Underside hindwing without a pale post-discal band. *H. sikkima* (16.5-18.0 mm.)
 - 5 Underside hindwing with a pale post-discal band.
 - 6 (7) Underside hindwing pale post-discal band usually narrow (less than 1.5 mm.). ♂
uncus bilobate (plate 18, figure 282 ♂ genitalia.) *H. zema* (15.0-17.5 mm.)
 - 7 Underside hindwing pale post-discal band broad (wider than 1.5 mm.). ♂ uncus
V-shaped (plate 18, figure 283 ♂ genitalia.) *H. zola* (14.0-15.0 mm.)
 - 8 Antennae not white-banded above.
 - 9 (10) Upperside forewing with two cell spots (plate 18, figure 281 ♂ genitalia.)
H. porus (14.5-15.5 mm.)
 - 10 Upperside forewing with, at most, a single upper cell spot.
 - 11 (26) Upperside forewing with post-discal and subapical spots as usual.
 - 12 (19) Underside hindwing with a fairly well defined pale central band.
 - 13 (14) Underside hindwing central band pale yellowish buff, and not very clearly defined.
♂ uncus hooks branched (plate 18, figure 286 ♂ genitalia.)
H. flava (12.0-14.5 mm.)
 - 14 Underside hindwing central band yellowish white with the outer edge clearly defined.
♂ uncus hooks unbranched.
 - 15 (16) Forewing cilia chequered. ♂ forewing 17 mm. (plate 18, figure 284 ♂ genitalia.)
H. homolea (13.5-15.5 mm.)
 - 16 Forewing cilia not chequered. ♂ forewing 13 mm.
 - 17 (18) Underside hindwing discal band yellowish white and sharply defined. ♂ inner edge
of valva with distal third continuously serrate (plate 18, figure 287 ♂ genitalia.)
H. auriferus (12.0-13.5 mm.)
 - 18 Underside hindwing discal band whiter and more diffuse. ♂ inner edge of valva with
distal third not continuously serrate (plate 18, figure 288 ♂ genitalia.)
H. kusala (12.0-14.0 mm.)
 - 19 Underside hindwing without a well defined pale central band, and the pale, narrow,
rather diffuse submarginal band inwardly edged with obscure dark spots.
 - 20 (23) ♂ uncus hooks broadly terminally expanded.
 - 21 (22) ♂ valva with a subapical spinous process (plate 19, figure 290 ♂ genitalia.)
H. wantona (13.0-14.0 mm.)
 - 22 ♂ valva without such a process (plate 18, figure 289 ♂ genitalia.)
H. peilethronix (14.0-15.0 mm.)
 - 23 ♂ uncus hooks not broadly terminally expanded.
 - 24 (25) ♂ uncus hooks terminally truncate (plate 19, figure 192 ♂ genitalia.)
H. velutana (13.0-14.0 mm.)
 - 25 ♂ uncus hooks tapering to a sharp point (plate 18, figure 285 ♂ genitalia.)
H. arcuata (15.0-16.0 mm.)
- (The above four species are very difficult to separate on facies, but, in *H. arcuata*,
the cell spot on the forewing is usually obscure or absent.)
- 26 Upperside forewing with the post-discal and subapical spots obsolete or very faint.
H. hieron (13.0-14.5 mm.)

Halpe zema ormenes (Plötz)

Plate 47, figures 207 and 208 ♂

The Banded Ace

This butterfly is dark brown above, with the usual *Halpe* pattern of small white hyaline spots on the forewing. On the hindwing beneath, there is a prominent white arcuate post-discal band extending from

space 1b to the apex ; of this band the inner edge is evenly curved and the outer edge is irregular and diffuse.

The butterfly may be taken in forest clearings flying around shrubs and bushes in bright sunshine. It is found at all usual elevations, and is rather local ; it is often possible to obtain a series when and where it occurs. As is usual in the genus, the female is rare. The species is distributed from Sikkim to Indo-China and Malaysia.

A species which is so similar to *H. zema* that the two cannot be satisfactorily separated on superficial characters is *H. zola zamba* Corbet, although, in Malaya, on the underside of this latter species the hindwing white band is broader, and the forewing narrow submarginal band is more prominent. *H. zola* has been found only on the plains in Malaya. Abroad, it is known from Assam, Burma and Java.

The very rare *H. insignis* (Distant), which is represented from south Burma to Neomalaya, is distinctive in the pure white cilia on the hindwing.

H. pelethronix pelethronix Fruhstorfer is widely distributed on the forested plains in Malaya, but is much less common on the hills. The butterfly is smaller than the two aforementioned species ; it is similar on the upperside, but, in place of the white post-discal band on the underside of the hindwing, this wing is marked with obscure yellowish interneural spots and streaks, and there is a rather faint and narrow macular submarginal band of the same colour. The species occurs from Burma to Malaysia. Two rare *Halpe* species which are so similar to *H. pelethronix* that they can hardly be separated without dissection are *H. veluvana brevicornis* Evans and *H. wantona* Swinhoe.

In the rather similar but slightly larger and darker *H. arcuata* Evans, the cell spot on the upperside of the forewing is often obscure or absent, the hindwing beneath has only faint indications of discal and submarginal markings, and the whole of the wing is overlaid with pale ochreous scaling. It occurs from Sikkim to the mountains of Malaya.

Genus *Pithauria* Moore

The adults are rather large and robust, with a forewing length of about 19 to 20 mm. The wings are dark brown above, with pale yellow (white in the female) hyaline spots in the cell and in spaces 2, 3, 6 and 7 (rarely in space 8) on the forewing. In the male the baso-dorsal third of the forewing and the basal two-thirds of the hindwing are clothed with pale yellowish or greenish hair scales. The underside is paler and more ochreous ; in addition to the hyaline spots on the forewing, each wing has a pale submarginal band and obscure or well-defined discal fasciae on the hindwing.

In the male of *P. marsena* there is a dark raised sexual stripe from the middle of vein 1b to the origin of vein 2 on the upperside of the forewing. Distributed from Sikkim to China and Malaysia.

Key for the separation of the species of PITHAURIA

- 1 (4) Underside hindwing without prominent and clearly defined white spots. ♂ upperside forewing without a brand.
- 2 (3) ♂ upperside baso-dorsal third of the forewing and the basal two-thirds of the hindwing clothed with pale greenish hairs. Underside forewing with a conspicuous creamy yellow patch filling at least the basal half of space 1b. *P. stramineipennis*
- 3 ♂ upperside basal areas clothed with greenish brown hairs. Underside forewing dorsum may be paler than the rest of the wing but there is not a conspicuously paler patch as in *P. stramineipennis*; ♀ otherwise very similar to *P. stramineipennis*. *P. mardara*
- 4 Underside hindwing with small, but clearly defined pale yellow spots in spaces 1b, 2, 3, 6 and the base of space 7. ♂ upperside forewing with a dark brand. *P. marsena*

***Pithauria stramineipennis stramineipennis* Wood-Mason and Nicéville**

Plate 47, figure 221 ♂

The Light Straw Ace

In this comparatively large and robust butterfly, the male is easily recognised by the pale greenish hair scales covering the basal areas of both wings. The forewing hyaline spotting is pale yellow in the male and white in the female, and consists of two diffuse cell spots, post-discal spots in spaces 2 and 3, and the usual subapical dots. The underside is buff brown, with a faint reddish hue; on the forewing the hyaline spots are larger and more distinct than above, and there is a prominent cream coloured dorsal patch, while the only markings on the hindwing are obscure dark submarginal and post-discal fasciae.

The males are found, often in some abundance, in quarries and in rocky localities in the forested lowlands. The female must be very rare for we have never caught it. The species is distributed from Sikkim to China, Malaya and Sumatra.

P. marsena (Hewitson) can be separated from *P. stramineipennis* by the conspicuous and clearly defined pale yellow spots on the underside of the hindwing. The males are found in situations similar to those of *P. stramineipennis*. The species ranges from Sikkim to Burma, Indo-China and Malaysia.

Ancistroides Group of Genera

Palpi with the third segment short, stout and conical, except in *Iambrix* and *Koruthaialos rubecula* where it is comparatively long and thin.

Upperside dark brown and unmarked, or the forewing with an orange-red discal band, but the forewing has a white hyaline discal band in *Notocrypta*, and, in *Udaspes*, the forewing has large white hyaline spots, and the hindwing has a large white discal area.

Key for the separation of the Genera of the ANCISTROIDES Group

- 1 (6) Forewing vein 5 straight and midway between veins 4 and 6 at its origin (fig. 149).
- 2 (3) Forewing veins 11 and 12 separate, and vein 11 about equidistant from veins 10 and 12 (fig. 149). Forewing costa arched and hardly longer than the dorsum. *Iambrix*
- 3 Forewing vein 11 bowed towards vein 12 (fig. 150) (except in individuals of *Koruthaialos bulant*).
- 4 (5) Forewing with the origin of vein 4 much nearer to vein 3 than to vein 5 (fig. 150). *Koruthaialos*

- 5 Forewing vein 4 abnormal and with its origin nearer to vein 5 than to vein 3 (fig. 151).
Forewing produced and costa arched. *Sancus*
- 6 Forewing vein 5 more or less downcurved at its origin, where it is much nearer vein 4 than vein 6 (fig. 152).
- 7 (8) Forewing vein 3 opposite vein 10 at their origins, and vein 4 not nearer vein 3 than vein 5 (fig. 152). Wings without white hyaline markings. *Ancistroides*
- 8 Forewing vein 3 opposite vein 9, and vein 4 much nearer vein 3 than vein 5 (fig. 153).
Wings with white hyaline markings.
- 9 (10) Hindwing cell half the length of the wing (fig. 153). Antennae longer than half the forewing costa. Forewing with a white hyaline band. *Notocrypta*
- 10 Hindwing cell shorter than half the length of the wing. Antennae shorter than half the forewing costa. Upperside both wings with white hyaline spots. *Udaspes*

Genus *Iambrix* Watson

Adults rather small (forewing length from 12 to 14 mm.), and with some diversity in structure and wing pattern. Palpi with the third segment comparatively long and thin, which character offers a ready means of separating *I. distanti* and *I. obliquans* from the rather similar *Koruthaialos butleri* and *K. sindu* respectively.



Fig. 148. *Iambrix salsala*. Head. Showing second segment of palpi erect.

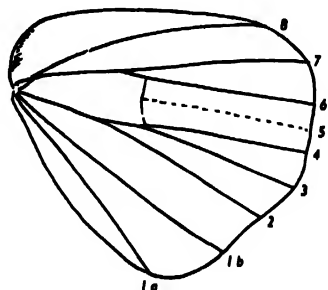
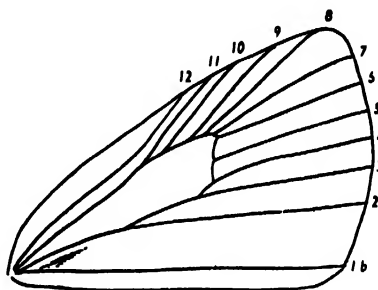


Fig. 149. *Iambrix salsala* ♂. Venation.

The male of *I. salsala* has a short narrow brand in the forewing cell between the origins of veins 2 and 3. In some lights, this brand appears as a white streak, but, in worn specimens, application of benzene may be necessary to make it visible. The male of *I. distanti* has a pale narrow brand just above the second quarter of vein 1b on the forewing. The male of *I. obliquans*

has a narrow brand below the second quarter of vein 1b on the forewing, and, on the underside of this wing, there is a black tuft from the basal part of the dorsum overlying a whitish patch in the middle of space 1b; on the hindwing above, the area between the costa and the radius is polished.

Distributed from Ceylon and India to China and Malaysia.

Key for the separation of the species of LAMBRIX

- 1 (4) Underside hindwing with small silvery white spots.
- 2 (3) Underside hindwing with the silvery spot in space 5 placed just beyond the end of the cell ; rarely a cell-spot present. *I. salsala* (12.0-13.0 mm.)
- 3 Underside hindwing with the silvery spot in space 5 placed midway between the cell-end and the termen ; always a spot present in the cell. *I. stellifer* (11.0-12.5 mm.)
- 4 Underside hindwing unmarked.
- 5 (6) Upperside forewing unmarked, dark velvety brown in ♂, paler in ♀. *I. distanti* (14.0-14.5 mm.)
- 6 Upperside forewing with a short, narrow, dull orange-red post-discal band, which is parallel to the termen. *I. obliquans* (11.0-12.5 mm.)

Lambrix salsala salsala (Moore)

Plate 47, figure 222 ♂; genitalia, Plate 19, figure 292

The Chestnut Bob

The wings are dark brown above and below. On the forewing above the male has an obscure, curved, pale ferruginous nacular post-discal band which is replaced, in the female, by a short series of white dots. On the underside, the costal half of the forewing and the whole of the hindwing are dusted with ferruginous brown, and on each wing there is a discal series of small silvery white spots. In fully spotted individuals these spots comprise, on the forewing, a cell-end spot and post-discal spots in spaces 1b (very diffuse), 2, 3, 4, 5, 6 and 8, and, on the hindwing, post-discal spots in spaces 1b, 5 and 7.

I. salsala is a common butterfly on the plains in Kedawi and Malaya proper. It occurs in fair numbers in forest, secondary growth, villages and gardens. The larva probably feeds on bamboo. The species ranges from Ceylon and India to China, Malaya, Sumatra and Java.

A similar butterfly is *I. stellifer* Butler, which is darker above, unmarked in the male, and with a few white post-discal dots on the forewing in the female. In fully spotted specimens the silvery white spots on the under surface comprise, on the forewing, a spot near the cell-end and post-discal spots in spaces 2, 3, 4 and 5, and, on the hindwing, a spot near the end of the cell and post-discal spots in spaces 1b, 2, 5 and 7 ; the spot in space 5 on the hindwing is midway between the end of the cell and the wing margin, and not just beyond the cell as in *I. salsala*. *I. stellifer* is more of a forest insect than is *I. salsala* ; it is not so common, although widely distributed on the plains in the Peninsula. The larva has been described as pale green, with a yellowish head with black marks, and it feeds on Bamboo. The species occurs from south Burma to Malaysia.

I. distanti Shepard, formerly known as *Idmon unicolor* (Distant), is dark brown with a slight golden sheen ; the dorsal half of the forewing is paler on the underside. *I. distanti* is essentially Neomalayan in distribution, and is rare on the forested plains in Langkawi and Malaya proper (genitalia, Plate 19, fig. 293).

***Iambrix obliquans obliquans* (Mabille)**

Plate 47, figure 223 ♂

The Small Red Bob

In this small species (forewing about 12 mm.), the wings are dark brown, and the forewing has a short orange-red post-discal band. This band is rather obscure in the male, but is paler, brighter and broader in the female.

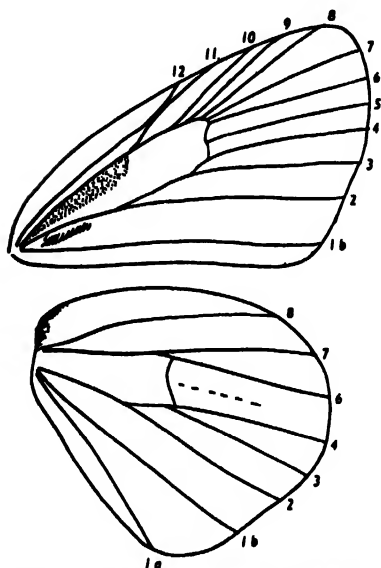
I. obliquans, which was formerly, but incorrectly, known as *I. sindu* (C. and R. Felder), ranges from south Burma to Malaysia, and is confined to the forested plains in Malaya.

Genus *Koruthaialos* Watson

Adults of moderate size, with the wings dark brown with a red discal band on the forewing, except in *K. butleri*, which is unmarked.

The males of all three species have a thin tuft of long hairs at the base of the costa on the hindwing; this tuft fits into a groove, situated below the radius on the underside of the forewing, which is overlaid with oblique scales.

Distributed from India to Malaysia and the Philippines.

Fig. 150. *Koruthaialos sindu* ♂. Venation.**Key for the separation of the species of
*KORUTHAIALOS***

- 1 (4) Forewing with a red or orange-red discal band.
- 2 (3) Upperside forewing discal band not reaching the costa. Palpi third segment long and thin. *K. rubecula* (14.0-17.0 mm.)
- 3 Upperside forewing discal band reaching the costa. Palpi third segment short, stout and just protruding. *K. sindu* (15.0-19.0 mm.)
- 4 Wings dark brown, with a plum-purple suffusion and unmarked; underside forewing dorsum broadly pale pinkish brown. Forewing vein 11 not as close to vein 12 as in other species of the genus. *K. butleri* (16.5-18.0 mm.)

***Koruthaialos rubecula rubecula* (Plötz)**

Plate 47, figure 224 ♂

The Narrow Banded Velvet Bob

This butterfly closely resembles the following species, *K. sindu*, but is easily separated from it by the comparatively long and thin third segment of the palpi (which is short, stout and hardly visible in *K. sindu*), by the smaller size, and by the narrower, shorter and deeper red discal

band on the forewing, which, unlike that in *K. sindu*, does not reach the costal margin.

K. rubecula is not rare on the forested plains of Kedawi and Malaya proper. The species occurs from Assam to Malaysia and the Philippines. The Nias race is entirely unmarked; a black form flies with the typical red-banded form in Assam and the Philippines.

Koruthaia los sindu sindu (C. and R. Felder,
Plate 47, figure 225 ♂; genitalia, Plate 19, figure 295

The Bright Red Velvet Bob

For a long time this species has been known by the later name of *K. xanites* (Butler).

The wings are dark brown above and below, and the forewing has a red band which extends from near the mid-costa to the tornus; this band is somewhat variable in width, and is paler and broader in the female.

The butterfly is common at the usual elevations in primary forest. The species is distributed from Assam to Malaysia; the Nias race is entirely black in the male and only faint traces of the red band persist in the female.

K. butleri (Nicéville) is unmarked above and below, but its separation from other unmarked Hesperids on structural characters is not difficult (genitalia, Plate 19, fig. 294). Outside Malaya the species is known only from Assam and Burma.

Genus *Sancus* Nicéville

On the underside of the forewing, the male of *Sancus fuligo* (the single representative of the genus), has a dark oval area of specialised scales under the origin of vein 2, and there is a corresponding nacreous area in the costal region of the upperside of the hindwing.

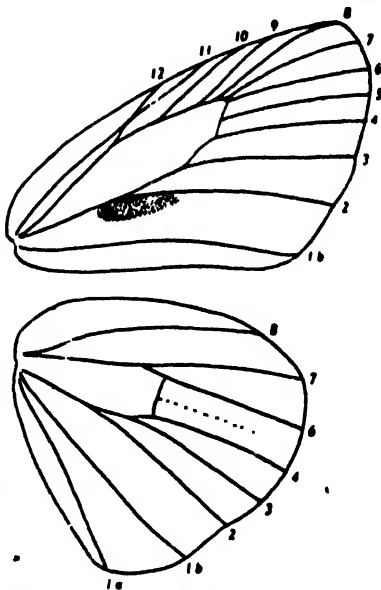


Fig. 151. *Sancus fuligo* ♂. Venation.

Sancus fuligo fuligo (Mabille)

Plate 47, figure 226 ♀; genitalia, Plate 19, figure 296

The Coon

The wings are dark brown above, paler in the female, and with a slight golden hue. The underside is paler, and marked with a few small and rather obscure ferruginous spots in spaces 7 and 8 on the

forewing and in spaces 2, 3, 4 and 6 and in the cell on the hindwing. The forewing length is 18 to 19.5 mm.

The butterfly is common, but is usually taken singly in forested country on the plains and foothills.

The larva is green, passing over to dark yellow on the thoracic segments, and the head has a brown margin and spots. It feeds on a species of Aroideae. The species ranges from India to Indo-China, Malaysia, the Philippines and Celebes.

Genus *Ancistroides* Butler

A. fulgur is rather aberrant, and differs from its congeners in the male genitalia, and in that vein 5 on the hindwing is oblique, and not down-curved at its origin.

The male of *A. armatus* has a large velvety black patch of specialised scales from vein 1b to the middle of the cell on the underside of the forewing, and a similar patch filling the cell on the upperside of the hindwing.

Distributed from north India through Malaysia to the Philippines and Celebes.

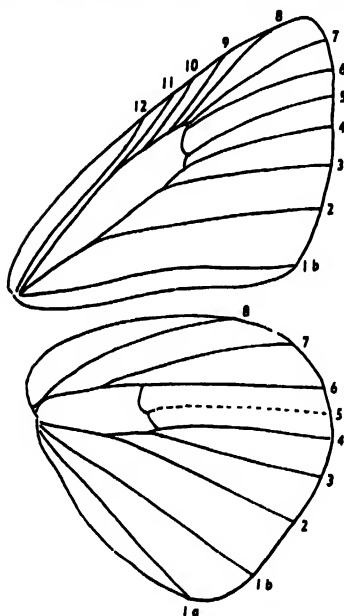


Fig. 152. *Ancistroides nigrata* ♂. Venation.

Key for the separation of the species of *ANCISTROIDES*

- 1 (4) Forewing longer than 20 mm. Underside hindwing unmarked.
- 2 (3) Upperside dark brown and entirely unmarked. *A. nigrata* (21.0-24.0 mm.)
- 3 Upperside forewing with a broad orange discal band.
A. armatus (23.0-26.0 mm.)
- 4 Forewing less than 20 mm. Underside hindwing with small pale purple or bluish spots, only visible in a side light.
- 5 (6) Forewing orange band with the inner edge convex towards the base. Underside forewing without pale subapical spots and underside hindwing without a pale spot at the cell end. ♂ thorax above dark brown.

A. gemmifer (17.0-18.5 mm.)
Forewing orange band with the inner edge concave towards the base and, in ♂, produced along the dorsum nearly to the base. Underside forewing with pale, purple subapical spots in spaces 5, 6 and 7, and underside hindwing with a small pale purple spot at the cell end. ♂ metathorax clothed with orange hairs.

A. fulgur (17.5-19.5 mm.)

Ancistroides nigrata maura (Snellen)

Plate 48, figure 236 ♂; genitalia, Plate 19, figure 297

The Chocolate Demon

Formerly known as *Kerana diocles* (Moore).

The butterfly is of rather large size (forewing length from 21 to

23 mm.), the wings are dark brown (paler in the female), and unmarked above and below, except that the marginal areas of both wings are broadly paler on the underside. It is a common butterfly in open woodland and in secondary growth near the forest edge, and may often be taken in moderate numbers.

The early stages resemble those of *Udaspes folus*. The larva is green, with a black head, and feeds on *Zingiber* (ginger) and *Curcuma* (turmeric). The pupa is also green.

The species is distributed from Sikkim to Malaysia and the Philippines.

***Ancistroides armatus armatus* (H. Druce)**

Plate 48, figure 235 ♂; ♀ genitalia, Plate 19, figure 298

The Red Demon

A. armatus is about the same size as *A. nigrita*; the wings are dark brown, and the forewing has a broad orange discal band extending from about the mid-costa to the tornus. The outer edge of the discal band is notched in space 5. On account of its size, *A. armatus* cannot be confused with any other Malayan species. Although widely distributed, it is not very common, and is usually taken in rather high forest country.

A. armatus occurs from south Burma to Neomalaya, and is found also in some of the Paramalayan islands. The Nias race *niasana* Evans is remarkable in that the male is without a trace of the orange band, and might be confused with *A. nigrita* but for the secondary sexual characters; in the female of *niasana* the orange band is replaced by a few obscure orange-red streaks.

A similar but smaller species is *A. gemmifer* (Butler), which has a forewing length of 14 to 16 mm., and is distributed also from south Burma to Neomalaya and Paramalaya, although it is not known from Nias. The forewing orange band, which is only weakly excavate in space 5, is broader in the female. *A. gemmifer* resembles *Koruthaialos sindu*, but differs in the indistinct, pale purple, glistening post-discal spots on the underside of the hindwing; in the male the forewing discal band is orange and not orange-red as in *K. sindu*. *A. gemmifer* frequents the same wooded localities as *K. sindu*, but is not nearly as common.

A. fulgur (Nicéville) is confined to the hills, and is quite the rarest Malayan member of the genus. It is larger than *A. gemmifer*, having a forewing length of 18 to 19 mm., and has obscure, glistening, purplish spots on the underside of both wings as stated in the key. Otherwise, the very rare female of *A. fulgur* resembles *A. gemmifer* superficially, but the male has the orange band on the forewing continued almost to the wing base in spaces 1a and 1b, there is an orange basal patch on the hindwing, and the metathorax is clothed with long orange hairs. *A. fulgur* is confined to Peninsular Siam, Malaya and Sumatra.

Genus *Notocrypta* Nicéville

The white hyaline discal band on the forewing comprises conjoined spots in spaces 1b, 2 and the distal end of the cell; in some forms there are white hyaline post-discal and subapical dots.

The genus is distributed from India to Palaearctic China and through the Archipelago to New Guinea, the Bismarcks and Australia.

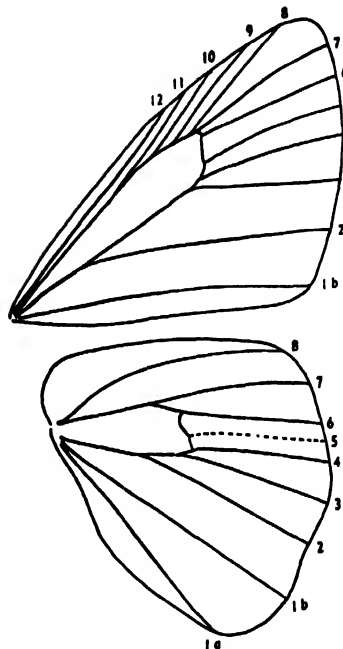


Fig. 153. *Notocrypta curvifascia* ♂.
Venation.

Key for the separation of the species of
NOTOCRYPTA

- 1 (8) Forewing without a trace of subapical dots in spaces 6 to 8.
- 2 (5) Forewing termen distinctly shorter than the dorsum and the apex nearly a right angle.
- 3 (4) Forewing white discal band very broad (6 mm. along vein 2), and the lower end truncated along vein 1b.
N. quadrata (18.0-20.0 mm.)
- 4 Forewing white discal band narrow (not more than 3 mm. along vein 2), and the dorsal end tapering and rounded.
N. fria (14.5-15.5 mm.)
- 5 Forewing termen equal to the dorsum and the apex acute.
- 6 (7) Underside forewing discal band usually not continued to the costa, and usually with a white dot in space 4. Forewing termen straight to vein 4 and then convex to the apex. Forewing discal band usually sharply elbowed at vein 2.
N. paralyssos (17.0-19.5 mm.)
- 7 Underside forewing discal band continued more or less full width to the costa, and rarely with a white dot in space 4. Forewing termen straight to vein 5 and then convex to the apex. Forewing discal band not sharply elbowed at vein 2.
N. clavata (19.0-21.0 mm.)
- 8 Forewing with two or three subapical dots which are at least traceable on the underside; there may be present also white dots in spaces 3, 4 and 5.
N. foisthamelii (18.0-21.0 mm.)
N. curvifascia (19.0-20.0 mm.)
- 9 (10) Underside forewing discal band continued above the radius to the costa.
- 10 Underside forewing discal band not continued above the radius.

Notocrypta paralyssos varians (Plötz)

Plate 47, figure 228 ♂; genitalia, Plate 19, figure 299

The Banded Demon

Both wing surfaces are black; the forewing has a white hyaline discal band composed of contiguous spots in spaces 1b and 2 and the distal end of the cell, and there is usually a white hyaline dot in space 4. The underside, which has a slight purple-brown hue, is faintly dusted with purplish near the termen.

The subspecies *varians* is common in primary and secondary lowland

forest in Malaya proper and Pulau Tioman. In Kedawi occurs the small subspecies *asawa* Fruhstorfer.

The species ranges from Ceylon and India through Malaysia to the Philippines, Celebes and Lesser Sunda Islands.

N. clavata clavata (Staudinger) is rather similar to *N. paralyso*, and nearly as common. It is larger than this latter species (forewing 19 to 21 mm. as against 17 to 19.5 mm.), the hindwing dorsum is distinctly longer, and the forewing white discal band is more regular and not so conspicuously notched at vein 2 as in *N. paralyso*. There is no spot in space 4 on the forewing in the male. Occurs in lowland forest.

N. feisthamelii alyso (Moore) resembles *N. clavata* in size and appearance, but differs from both this species and *N. paralyso* in the presence of subapical spots on the forewing. *N. feisthamelii* frequents the forested hills and plains, as does *N. curvifascia corinda* Evans, which has subapical spots on the forewing, as well as spots in spaces 4 and 5 in the female, but differs from all other *Notocrypta* species in that the white discal band is never continued above the cell on either wing surface.

The two rarities in the genus are *N. quadrata* Elwes and Edwards (forewing 19 mm., and with a very broad white discal band), and *N. pria* (H. Druce) (of small size, forewing quadrate, about 14 mm. in length, and the discal band narrow and sinuous). The former species occurs in primary forest at the usual elevations, but *N. pria* is confined to the plains.

The *Notocrypta* larvae are green with light transverse rings and they feed on *Musa* (banana) and *Curcuma*. The butterflies are found flying around shrubs and flowers in bright sunshine.

The widely distributed *N. feisthamelii* ranges from India and China through the Archipelago to the Moluccas. *N. curvifascia* occurs from India to China and Malaysia. The other species are essentially Neomalayan in distribution.

Genus *Udaspes* Moore

In spite of the obvious superficial differences, this genus is structurally close to *Notocrypta*. Essentially, the forewing markings are the same in both genera, but, in *Udaspes*, the white discal band is broken and the post-discal and subapical spots are larger and conjoined.

Udaspes folus occurs from Ceylon to Formosa, Malaysia and the Lesser Sunda Islands, while a second species is found in Palearctic China.

Udaspes folus (Cramer)

Plate 47, figure 229 ♂

The Grass Demon

This butterfly is taken singly at flowers in gardens and in secondary growth and is not uncommon. It cannot be mistaken for any other Malayan butterfly.

The wings are dark brown above, the forewing with a white hyaline discal fascia composed of spots in spaces 1b and 2 and the distal part of the cell (the last mentioned spot being moved inwards), and with smaller white spots in spaces 3, 4 and 5 (the last two conjoined) and in spaces 6 to 9 (of which all are conjoined); the hindwing has a large white discal patch. The underside is more ferruginous; on the hindwing the tornal area is paler and there is a ferruginous brown spot below the cell-end.

The larva is green with a black head and has been found on *Curcuma* (tumeric) and *Fagraea racemosa*. The slender pupa has a long, snout-like vertex to the head and is fastened to a leaf of the food plant with a few threads.

Throughout its extensive range, *U. folus* occurs in its typical form, no subspecies being known.

Plastingia Group of Genera

This group comprises a large assemblage of rather diverse elements, and the facies cannot be defined in general terms. In a majority of genera, the upperside is dark brown, with white or pale yellow hyaline spots on the forewing (united to form a compact band in *Oerane*), and, in *Scobura*, some species of *Isma*, the *callineura* group of *Plastingia*, *Eetion*, *Acerbas* and *Unkana ambasa* ♀, with pale markings on the upperside of the hindwing; in *Lotongus onara*, the basal half of the hindwing is pale orange.

The upperside is entirely unmarked, and the hindwing tornal cilia yellow in *Matapa*, *Zela xenon*, *Z. smaragdinus*, *Gangara lebadea* ♂ and *Pirdana*. The upperside is entirely unmarked, except for the white tornal area on the hindwing, in *Suastus minuta*. The upperside is unmarked, and the hindwing tornal cilia are concolorous, in *Hyarotis iadera*, *Quedara monteithi* ♂, and *Ge geta* ♂. The upperside has prominent yellow bands, but no hyaline spots, in *Cupitha*.

Key for the separation of the Genera of the PLASTINGIA group

- 1 (22) Antennal apiculus not longer than twice the width of the club (longer in *Lotongus calathus* and *L. avesta*). Usually, palpi second segment slender, and third segment pointed and protruding.
- 2 (9) Hindwing dorsum not longer than the costa.
- 3 (8) Palpi third segment long and thin. Forewing vein 5 straight.
- 4 (7) Forewing vein 4 nearer vein 3 than vein 5; vein 11 nearer vein 12 than vein 10. Underside hindwing without dark spots.
- 5 (6) Forewing apex not produced. Both wings with white hyaline spots. *Scobura*
- 6 Forewing apex produced. Forewing with white hyaline spots, and underside hindwing almost entirely white. *Suada*
- 7 Forewing vein 4 midway between veins 3 and 5; vein 11 midway between veins 12 and 10. Underside hindwing with dark spots on the whitish ground. *Suastus*
- 8 Palpi third segment comparatively short. Forewing vein 5 downcurved at origin. Upperside dark brown with yellow bands, and underside mostly yellow. *Cupitha*
- 9 Hindwing dorsum longer than the costa (fig. 154).
- 10 (19) Forewing vein 3 opposite vein 9 rather than vein 10.
- 11 (14) Forewing vein 5 downcurved at origin.
- 12 (13) Palpi third segment comparatively short. Antennae not white-banded before the apiculus. Upperside forewing with white hyaline spots, and underside hindwing usually with dark spots. *Zographetus*

- 13 Palpi third segment long and thin. Antennae white-banded before the apiculus. Upperside forewing with a compact white hyaline band. *Oreana*
- 14 Forewing vein 5 straight. Palpi third segment comparatively short.
- 15 (16) Antennae not nearly as long as forewing cell. Upperside forewing with white spots or unmarked. *Hyarotis*
- 16 Antennae long, as long as the forewing cell in ♂, and to end of vein 12 in ♀.
- 17 (18) Upperside forewing without subapical spots. Upperside unmarked in ♂, and forewing with a white, hyaline, compact band in ♀. *Quedara*
- 18 Upperside forewing with subapical spots. Upperside forewing and, in some species, the hindwing also with white hyaline spots. *Isma*
- 19 Forewing vein 3 opposite vein 10 rather than vein 9 (fig. 154). Palpi third segment comparatively short. Antennae as long as or longer than half the forewing costa.
- 20 (21) Hindwing cell at least as long as half the length of the wing (fig. 154). Upperside forewing with a yellow streak in space 1b. *Plastigia*
- 21 Hindwing cell less than half the length of the wing. Upperside forewing without a yellow streak in space 1b. Forewing with whitish hyaline spots, and underside hindwing marked with pale yellow or orange. *Lotongus*
- 22 Antennal apiculus longer than twice the width of the club. Usually, palpi second segment stout, and third segment very short, stout, bluntly conical and not distinctly visible.
- 23 (32) Forewing cell less than the hindwing dorsum (fig. 155). Hindwing dorsum not longer than the forewing dorsum.
- 24 (29) Hindwing cell less than half the length of the wing (fig. 155) (except in *Eronota harmachis*, where the cell is equal to half the wing length).
- 25 (26) Forewing vein 5 downcurved at origin. Eyes red. Hindwing tornal cilia orange. *Zela*
- 26 Forewing vein 5 straight (fig. 155). Forewing with large, yellowish, hyaline spots (except in *Gangara lebadea* ♂).
- 27 (28) Underside hindwing with bluish or purplish white scaling. Hindwing origin of vein 2 before the origin of vein 7 (fig. 155) (except in *G. lebadea* ♀). *Gangara*
- 28 Underside hindwing without whitish scaling. Hindwing origin of vein 2 after the origin of vein 7. *Eronota*
- 29 Hindwing cell equal to half the length of the wing (fig. 156).
- 30 (31) Forewing apex of cell not produced, and vein 4 opposite vein 7 or 8. Hindwing tornal cilia not orange or yellow. ♂ unmarked, ♀ upperside forewing with small, pale yellow, hyaline spots. *Go*
- 31 Forewing apex of cell distinctly produced, and vein 4 opposite vein 9. Eyes red. Hindwing tornal cilia orange or yellow. Wings dark buff brown and unmarked. *Malapa*
- 32 Forewing cell at least as long as the hindwing dorsum (fig. 156). Hindwing dorsum usually longer than the forewing dorsum. Hindwing tornus more produced.
- 33 (38) Antennae not longer than half the forewing costa.
- 34 (35) Forewing vein 5 straight. Upperside forewing with pale yellow or white hyaline spots; underside hindwing with a white area which may appear on the upperside. *Unkana*
- 35 Forewing vein 5 downcurved at origin.
- 36 (37) Hindwing cell as long as half the wing length. Upperside forewing with separated, pale yellow, hyaline spots, including a spot in space 1b. Underside with the apical area of the forewing and the entire hindwing pale buff brown. *Hidari*
- 37 Hindwing cell less than half the wing length. Upperside both wings with white hyaline spots, and underside hindwing broadly white below vein 8. *Estion*
- 38 Antennae longer than half the forewing costa.
- 39 (40) Forewing with upper apex of the cell rounded or somewhat produced; vein 4 opposite to vein 8. Head green. Upperside forewing with white hyaline spots, and hindwing with a white or whitish discal fascia. *Aerbas*
- 40 Forewing with upper apex of the cell acutely produced; vein 4 opposite to vein 9, and veins 4 and 5 strongly bowed (fig. 156). Upperside dark brown, unmarked, and hindwing with tornal area narrowly yellow. Underside hindwing green. *Pirdana*

Genus *Suada* Nicéville

The wings above are brown; the forewing has a white hyaline spot in space 2 immediately below a spot in the lower end of the cell, sometimes a minute spot at the base of space 3, and three subapical spots decreasing from space 6 to space 8, and a non-hyaline streak in space 1b. On the

underside, the forewing apex, termen and costal margin are white to buff, and the white on the hindwing merges into buff towards the costa. Sexes alike.

S. swerga suava Evans is rare in lowland forest in Malaya: the species ranges from Sikkim to Malaysia, and occurs in very distinct geographical races.

Genus *Scobura* Elwes and Edwards

Medium sized butterflies; on the underside, the apex and costa of the forewing and the whole of the hindwing are dusted with ochreous scaling. The hyaline spots comprise, on the forewing, a spot in the cell, a spot in space 2 immediately below it, and two or three subapical spots, and, on the hindwing, a conjoined spot in spaces 4 and 5. The forewing above has a non-hyaline spot in space 1b. Sexes alike, except that the male of *S. phiditia* has a greenish brown erect hair tuft arising near the base of the radius on the hindwing above, and the basal portion of vein 2 and part of the cubitus beyond, on the forewing beneath, are swollen.

The genus is distributed from Assam to China and Malaysia.

The two Malayan species are confined to lowland primary forest. *S. phiditia* (Hewitson) which occurs from Assam to Indo-China and Neomalaya, and *S. isola* (Swinhoe), which extends from Assam to Malaya, are easily separated by the presence of an additional white spot in space 2 on the hindwing in the latter species.

Key for the separation of the species of *Scobura*

- 1 (2) Upperside hindwing with a single large central hyaline spot in spaces 4 and 5. *S. phiditia*
- 2 Upperside hindwing with a hyaline spot in space 2, as well as a conjoined spot in spaces 4 and 5. *S. isola*

Genus *Suastrus* Moore

The adults are rather variable in size, ranging from 13 mm. (*S. everyx*) to 17-18 mm. (*S. gremius*). The wings are brown above, unmarked in *S. everyx*, but the forewing has the usual white hyaline post-discal spots and one or two cell spots in the other species. The hindwing is unmarked, although the tornal area is white in *S. everyx* and the tornal cilia are white in all three species. The underside of the hindwing is characteristic, being overlaid with whitish or buff scaling and with dark spots.

The genus is represented from Ceylon and India, through Malaysia, to the Philippines and the Lesser Sunda Islands.

All the species are rare in Malaya. *S. gremius gremius* (Fabricius), which can be readily recognised by the very prominent black spots on the underside of the hindwing, appears to be confined to Province Wellesley (mangrove) and Perlis. The larva feeds on palms (*Caryota*, *Cocos*, *Calamus*, etc.), and lives in a cylindrical cell made from a longitudinally folded leaf and densely covered with silk. The extra-Malayan distribution of *S. gremius* is rather curious; it occurs from Ceylon and India to Siam and China, appears to be absent from Malaysia, but

reappears in Sumba and Flores. *S. minuta aditia* Evans is known only from the Langkawi Islands as far as Malaya is concerned.

(Basic literature: Evans, 1943a.)

Key for the separation of the species of *Suastus*

- 1 (2) Upperside dark brown and unmarked; hindwing tornal area white. *S. coarctus*
- 2 Upperside forewing brown with white hyaline spots; hindwing tornal area not white.
- 3 (4) Underside hindwing overlaid with whitish scaling and with obscure and ill-defined dark spots. *S. minuta*
- 4 Underside hindwing overlaid with buff scaling and with a number of sharply defined black spots. *S. gremius*

Genus *Cupitha* Moore

In this monotypical genus, the male is remarkable for the pale oval vesicle, which appears to be filled with a waxy substance and is situated in the cell of the upperside of the hindwing; there is a corresponding vitreous area on the dorsum of the forewing beneath, bearing a thin tuft of hairs at its edge.

The wings above are dark brown, with yellow bands arranged much as in *Telicota*, but the underside is yellow and entirely unmarked, except for a black basal wedge and a black tornal patch on the forewing.

C. purpurea (Moore) (Plate 28, figure 30 ♂) frequents open areas in lowland forest in Malaya, and is rather rare. The larva feeds on *Terminalia paniculata*, *T. bellirica* and *Combretum ovalifolium*, and is the only known Oriental species of Hesperinae that is confined to dicotyledonous food plants. The species is distributed from India to Malaysia and Celebes.

Genus *Zographetus* Watson

Adults of moderate size, with the upperside dark brown, and with rather small white hyaline spots on the forewing, viz., one or two spots in the distal end of the cell and single spots in spaces 2, 3, 6 and, sometimes, in spaces 7 and 8; often the female has a spot in space 1b. Usually the underside is ferruginous brown, with dark spots on the hindwing; the hindwing is unmarked in *Z. rama*, and in *Z. satwa* the basal half of the hindwing and the basal two-thirds of the costa on the forewing are yellow.

The males of *Z. satwa* and *Z. ogygia* have glandular streaks along the basal portions of veins 1b, 2 and the median on the forewing above, but these may be absent in individuals of the latter species. In the male of *Z. rama*, the forewing beneath has the basal portion of vein 2 and the cubitus thickened, and a black recumbent hair tuft at the base of space 1b.

The genus is distributed from north India, through Malaysia, to the Philippines, Celebes, and Lesser Sunda Islands. In Malaya, the butterflies are confined to primary forest, and *Z. satwa* and *Z. rama* have been found only on the plains. *Z. ogygia ogygioides* Elwes and Edwards is widely distributed although everywhere rare.

Key for the separation of the species of *ZOGRAPHETUS*

- 1 (2) Underside hindwing pale yellow, with the termen broadly bordered with purple-brown. *Z. satwa*
- 2 Underside ferruginous, or ferruginous with obscure yellow patches.
- 3 (4) Underside hindwing with a series of dark post-discal spots, and a dark spot in the cell. *Z. ogygia*
- 4 Underside hindwing more ochreous than in *Z. ogygia*, unicolorous and unmarked. *Z. rama*

Genus *Oerane* Elwes and Edwards

Small size (forewing 14 mm.). The wings are black, and the forewing has a large white hyaline discal spot composed of smaller spots in spaces 2 and 3 and the distal end of the cell. On the dark brown underside, the forewing has pale yellowish scaling above the cell spot, and the dorsum is paler towards the tornus.

The single species, of which the Malayan race is *O. microthysus neaera* (Nicéville), is confined to lowland forest in the Peninsula, and is distributed from south Burma through Malaysia to the Philippines. The larva is said to feed on *Daemonorops oblongus* which does not grow in Malaya.

Genus *Hyarotis* Moore

The forewing length ranges from 14 mm. (*H. iadera*) to 18 or 19 mm. (*H. adrastus*). The wings are dark brown above, and the forewing has white hyaline spots in the cell, in space 2 (not in line with the cell spot), near the base of space 3, and the usual subapical series; there is a semi-hyaline spot in the middle of space 1b. The markings are very small and obscure in *H. microstictum*, and obsolete in *H. iadera*. The underside is paler than the upper, and there is an irregular white discal fascia on the hindwing in *H. adrastus*. The antennal club is white tipped in *H. adrastus* and *H. microstictum* (underside only).

The males of *H. microstictum* and *H. iadera* have a long tuft of hairs (partly up-turned and partly down-turned) on the dorsum on the forewing beneath. On account of this character, these two species were formerly separated as the genus *Kineta* Lindsey.

The genus is represented from India and Burma to Malaysia and the Philippines. In Malaya, *H. adrastus* and *H. microstictum* are rare in lowland forest.

Key for the separation of the species of *HYAROTIS*

- 1 (2) Underside hindwing with an irregular white discal fascia. Hindwing cilia chequered white and brown. *H. adrastus* (16.5-18.0 mm.)
- 2 Underside hindwing unmarked. Hindwing cilia not chequered.
- 3 (4) Upperside dark brown with narrow and obscure white hyaline spots, which are more prominent on the underside. *H. microstictum* (15.5-19.5 mm.)
- 4 Upperside deep purple-brown and unmarked (genitalia, Plate 19, fig. 300.) *H. iadera* (14.0-15.0 mm.)

Genus *Quedara* Swinhoe

In *Q. monteithi monteithi* (Wood-Mason & Nicéville), the sole Malayan representative of the genus, the male is dark brown and unmarked above and below, and, in the female, the white hyaline discal band on the forewing comprises conjoined spots in spaces 1b, 2, the base of space 3 and

the cell; the inner edges of the spots in space 2 and the cell are in line, and, on the underside, the band is continued non-hyaline almost to the costa. The butterfly is rare in lowland forest in Malaya; it is essentially Malaysian in distribution, and is not found north of southern Burma. Genitalia, Plate 19, fig. 301.

The genus occurs from south India and Assam, through Malaysia to the Philippines.

Genus *Isma* Distant

Formerly all species except *I. protoctea* and *I. obscura* were included in a separate genus *Sepa* Nicéville on account of the differences in the male secondary sexual characters. Superficially, many of the *Isma* species are similar to certain species in the *Pelopidas* group, but they can be easily separated as vein 5 on the forewing is straight and not downcurved at its origin.

The butterflies are dark brown above; the forewing has white, or yellowish white hyaline post-discal spots (in spaces 1b, 2, 3, 4, 6 and 7 in fully spotted forms) and, usually, separated cell spots are present. In some species, the hindwing also has a compact series of post-discal spots. On account of the similarity between species, the diversity between the sexes, and the rather marked tendency towards individual variation, identification may be difficult.

The males of *I. protoctea* and *I. obscura* are characterised by an obscure, dark, oval brand in the basal area of space 1b on the upperside and a black mid-dorsal tuft on the underside of the forewing; the hindwing has a recumbent hair tuft in the basal portion of space 7 above, and the tornal cilia are markedly elongate. The true *Sepa* species may have, on the forewing above, an oblique discal stigma running from the middle of space 1b to the origin of vein 3 and a basal brand in space 1b. In *I. cronus* the tornal cilia on the hindwing are elongate.

Only in the case of a single species are the early stages known. The larva of *I. feralia* has been described as having alternate dark green and more yellowish transverse bands and a dark brown head. It feeds on *Musa* and *Pandanus*. The pupa is green.

The genus is essentially Malaysian in distribution, although representatives extend to south Burma and Indo-China.

(Basic literature: Evans, 1939.)

Key for the separation of the species of *Isma*

- 1 (4) ♂ hindwing cilia very elongate (at least 2 mm.), and upperside forewing without a discal stigma. ♀ underside forewing dorsum conspicuously whitened from near the termen almost to below the origin of vein 2.
- 2 (3) Underside with forewing apex and costa and entire hindwing rather sparsely overlaid with greenish ochreous scales. ♀ upperside forewing with a spot in space 1b; underside forewing not strongly whitened below vein 1b.

I. protoctea (14.0-15.5 mm.)
- 3 Underside with a faint purple glaze, and very sparsely overlaid with paler scales. ♀ upperside forewing usually without a spot in space 1b; underside forewing dorsum strongly whitened from vein 2 to the dorsal margin.

I. obscura (16.0-18.5 mm)

- 4 ♂ hindwing cilia not elongate (except in *I. cronus*, which has a discal stigma on the forewing). ♀ underside forewing dorsum not conspicuously whitened as above.
- 5 (14) Forewing longer than 15 mm.
- 6 (9) ♂ upperside forewing with a discal stigma, but without a basal brand in space 1b.
♀ upperside forewing usually without cell spots, but the lower cell spot is rarely present in *I. feralia*, and the upper spot may be present in *I. cronus*, although, in this species, there is no spot in space 1b.
- 7 (8) Upperside forewing without a spot in space 1b, and the hindwing unmarked. ♂ upperside forewing without cell spots. *I. cronus* (18.0-20.0 mm.)
- 8 Upperside forewing with a spot in space 1b, and upperside hindwing with two or three conspicuous spots. ♂ upperside forewing with cell spots. *I. feralia* (17.0-18.0 mm.)
- 9 ♂ upperside forewing with a discal stigma (absent in individuals of *I. guttulifera*) and a basal brand in space 1b. ♀ upperside forewing with cell spots.
- 10 (11) ♂ upperside hindwing spots very small. ♀ upperside forewing cell spots small, and the hindwing without spots. *I. miosticta* (14.5-16.0 mm.)
- 11 ♂ upperside hindwing with three or four conspicuous contiguous spots. ♀ upperside with conspicuous cell spots on the forewing or conspicuous spots on the hindwing.
- 12 (13) ♂ upperside forewing cell spots unequal and the lower one extended basad ; a discal stigma from vein 2 to the origin of vein 3. ♀ upperside forewing cell spot small and the hindwing with spots (genitalia, Plate 19, fig. 302.) *I. umbrosa* (15.0-17.0 mm.)
- 13 ♂ upperside forewing cell spots more or less equal, or the lower spot not more produced basad than distad ; discal stigma usually absent, but, when present, from vein 1b to the origin of vein 3. ♀ upperside forewing with prominent cell spots, as in the male, but the hindwing spots absent or very faint. *I. guttulifera* (17.0-19.0 mm.)
- 14 Forewing not longer than 15 mm.
- 15 (16) Underside hindwing ferruginous brown. ♂ aedeagus with a distal hooked spine. *I. bononoides* (13.0-14.5 mm.)
- 16 Underside hindwing greenish yellow. ♂ aedeagus without a distal hooked spine. *I. bononia* (13.0-14.0 mm.)

Isma protoclea iapis (Nicéville)

Plate 47, figuré 230 ♂

The Plain Tufted Lancer

I. protoclea is one of the smaller species of the genus, with a forewing length of not more than 14 mm. The wings are dark brown above, with decreasing whitish hyaline post-discal spots in spaces 2, 3, 4, 6 and 7, and with two spots in the cell of the forewing ; the lower cell spot is narrow, elongate and situated above the spot in space 2, and the upper cell spot is a large dot. On the underside, the apical area of the forewing and the entire hindwing are sparsely overlaid with greenish ochreous scales.

The male is remarkable in this species and in the similar but larger *I. obscura obscura* Distant for the elongate tornal cilia on the hindwing.

Like most of the Malayan species of *Isma*, *I. protoclea* and *I. obscura* are confined to lowland forest, where they are rather uncommon.

I. cronus Nicéville is restricted to the hills, and is easily recognised by the reduced markings on the forewing, and, in the male, by the oblique whitish discal stigma on the forewing, and the elongate tornal cilia on the hindwing.

Although rare, *I. umbrosa umbrosa* (Elwes and Edwards) and *I. guttulifera* (Elwes and Edwards) are widely distributed in Malaya. In both species, the males are fully spotted, having two cell spots on the forewing and three or four discal spots on the hindwing ; in the former species,

however, the lower cell spot on the forewing is not immediately below the upper spot, but is shifted inwards towards the base of the wing. Normally, the male of *I. guttulifera* is without a discal stigma, but, occasionally, a brand is present; this latter form was (Plate 47, fig. 227 ♂) formerly regarded as a distinct species (*I. damocles* (Evans)), although the male genitalia of the two appear to be identical.

Genus *Plastingia* Butler

Moderately large butterflies, with the antennae longer than half the length of the forewing costa. Wings dark brown above, with pale yellow hyaline spots in the cell, and in spaces 2, 3, 6 and 7 on the forewing.

In the *callineura* group, there are additional hyaline spots in spaces 4 and 5 (the latter minute), as well as yellow basal streaks on the forewing, and, on the hindwing, there are hyaline spots on the yellow post-discal patch which extends narrowly to the base of the cell. The underside is yellow, with the veins broadly dusted with yellow or red, and with bluish spotting. In the *sala* group the underside pattern is more sombre.

The species are rare in Malaya, where they are taken singly in rather open forest. The genus is distributed from Sikkim to Indo-China, Malaysia, the Philippines and Celebes.

(Basic literature: Evans, 1941a.)

Key for the separation of the species of *PLASTINGIA*

- 1 (14) Forewing with vein 2 arising much nearer to the base of the wing than to the origin of vein 3.
- 2 (9) Underside hindwing tornus broadly dark brown, due to the yellow basal streaks in spaces 1a and 1b not extending beyond the middle of the wing. (*callineura* group)
- 3 (8) Forewing with the line joining the outer edges of the spots in spaces 6 and 7 directed to the termen.
- 4 (5) Underside hindwing vein 8 edged with ochreous red on both sides throughout its length.
- 5 Underside hindwing vein 8 only narrowly yellow dusted.
- 6 (7) Underside forewing without bluish scaling in space 5, of which the basal half is dark brown, except for some narrow yellow scaling under vein 6. ♂ antennal shaft white. *P. darna* (18.0–19.0 mm.)
- 7 Underside forewing with the basal half of space 5 filled in with bluish or purplish scaling, which extends into space 4. ♂ antennal club white above. *P. klanga* (20.0 mm.)
- 8 Forewing with the line joining the outer edges of the spots in spaces 6 and 7 directed to the dorsum. ♂ antennal shaft pale yellow. *P. laevis* (18.0–19.0 mm.)

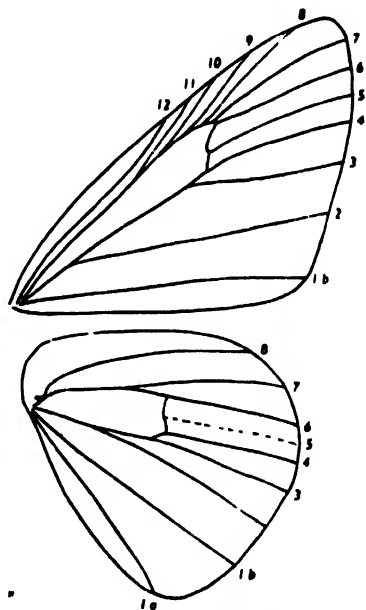


Fig. 154. *Plastingia callineura* ♂.
Venation.

- 9 Underside hindwing with the yellow streak in space 1a extending nearly to the termen, and that in space 1b reaching the termen, thus giving the tornal area a much yellower appearance.
- 10 (13) Forewing with the line joining the outer edges of the spots in spaces 6 and 7 directed to the dorsum, and the spots in spaces 2 and 3 well separated.
- 11 (12) Upperside forewing cell brown almost to the base, and the extreme base of space 2 also brown. ♀ upperside forewing with the yellow spot in space 1b conjoined with the hyaline spot in space 2. *P. flavia* (16.0 mm.)
- 12 ♂ upperside forewing with the entire wing base yellow up to the spot in space 2. ♀ very similar to *P. flavia*, but the upperside of the forewing has the spot in space 1b separated from the spot in space 2. *P. helena* (14.5-15.5 mm.)
- 13 Forewing with the line joining the outer edges of the spots in spaces 6 and 7 directed to the termen, and the spots in spaces 2 and 3 overlapping and conjoined, making the post-discal band compact. *P. aurantiaca* (16.0-18.0 mm.)
- 14 Forewing with vein 2 arising from about midway between the base of the wing and the origin of vein 3. (*sala* group)
- 15 (24) Underside hindwing with markings.
- 16 (21) Underside hindwing pale purple-buff or yellow, and with a semi-circular series of small dark brown post-discal spots, a round spot at the end of the cell, and spots at the bases of spaces 1b and 7.
- 17 (20) Upperside hindwing without a prominent yellow patch. Underside hindwing purple-buff.
- 18 (19) Upperside forewing with the lower cell spot larger than the upper; a subapical spot present in space 6, and, sometimes, in space 7 also. *P. fuscicornis* (14.0-16.0 mm.)
- 19 Upperside forewing with the lower cell spot (which may be absent), not larger than the upper; no subapical spots present. *P. sala* (15.5-17.0 mm.)
- 20 Upperside hindwing with a prominent yellow patch. Underside hindwing yellow to reddish yellow. *P. lavayana* (17.0-18.0 mm.)
- 21 Underside hindwing without small dark spots, and marked with numerous white or pale yellow elongate spots.
- 22 (23) Underside with white spots. Upperside yellow markings obscure. *P. naga* (15.5-18.0 mm.)
- 23 Underside with pale yellow spots. Upperside yellow markings more prominent. *P. pellonia* (16.0-17.5 mm.)
- 24 Underside hindwing unmarked.
- 25 (26) Upperside forewing no spot in space 4. Upperside hindwing with an obscure, yellow discal area. Palpi third segment blunt and not protruding. *P. corissa* (17.0-18.5 mm.)
- 26 Upperside forewing with a spot in space 4. Upperside hindwing unmarked. Palpi third segment pointed and protruding. *P. pugans* (16.0-18.0 mm.)

Plastingia latoia latoia (Hewitson)

Plate 47, figure 231 ♂

The Yellow-vein Lancer

This species and *P. callineura* are the least uncommon species of the *callineura* group of the genus. In *P. latoia* the forewing length is 18 to 19 mm., and the upperside is dark brown. The forewing has decreasing, pale yellow, hyaline spots in spaces 2, 3, 4 and 5 and two small subapical spots in spaces 6 and 7 which are directly above the spot in space 4; of the two elongate cell spots, the lower one is nearer the base. In addition to the hyaline spots, the forewing has a yellow baso-costal streak, as well as a broader yellow streak in space 1b. On the hindwing the hyaline post-discal spots in spaces 2, 3 and 4 and 5 (the last two conjoined) are surrounded and partly overlaid by a yellow band, from which a streak runs to the base of the cell; another yellow streak runs to the base in space 1a. On both wings the cilia are orange.

The underside has the veins dusted yellow. In the male the antennal shaft is pale yellow, but only the club is yellow in the female.

P. latoia is rare in primary and, occasionally, in secondary forest in the Malayan lowlands. It is usually taken singly flying around rather tall shrubs in the sunshine. The species is distributed from south Burma to Malaysia. Genitalia, Plate 19, fig. 303.

A similar but larger species is *P. callineura niasana* Fruhstorfer, which differs from *P. latoia* and all allied species in that the veins on the underside are edged with ochreous red. The species is widely distributed on the forested plains, but is always rare.

The remaining species of the *callineura* group are very rare in Malaya. Two species which have only recently been separated from *P. latoia* are *P. klanga* and *P. derna*, and the former is known only from two Malayan males. *P. derna* was taken in Singapore by Wallace, and has since been found on the mainland by Eliot; abroad, it occurs in Sumatra, Borneo and Palawan and appears not to be remarkably rare. *P. aurantiaca montivaga* Pendlebury and *P. helena* Butler are easily recognised by the extensive yellow colouring on the upperside in the male. Apart from *P. aurantiaca*, which is confined to the hills, the above species are lowland in habitat.

All the members of the *callineura* group are essentially Neomalayan in distribution, although *P. callineura* and *P. flavia* extend to India and Java.

Plastingia pugnans pugnans (Nicéville)

Plate 47, figure 232 ♂

The Pugnacious Lancer

At first glance, *P. pugnans* suggests a species of *Isma*, but it has the yellow streak in space 1b on the forewing above, which is characteristic of *Plastingia*. The pale yellowish hyaline spots on the forewing comprise an upper and lower (and longer) spot in the cell, and decreasing spots in spaces 2, 3 and 4 and in spaces 6 and 7.

This insect is the least rare of the Malayan species of *Plastingia*, and occurs in primary forest in Kedah, and at the usual elevations in Malaya proper. It is distributed from south Burma to Malaysia.

All the remaining species of the *sala* group are decidedly rare, and *P. fuscicornis* and *P. tavoyana* are known only from the Langkawi Islands as far as the Peninsula is concerned. The others have been taken in lowland forest in Malaya proper, and *P. sala* has been found on Pulau Tioman. Most of these species are widely distributed in Malaysia, and there is still some doubt regarding the identity of the component races.

Genus *Lotongus* Distant

Adults rather large, forewing 18 to 23 mm. The dark brown second segment of the palpi has some yellow scaling.

L. onara, which differs from its congeners in the shorter apiculus, has the basal half of the hindwing orange, and bears a superficial resemblance

to *Hasora schoenherri*: the male has a narrow dark brand lying along the inner edge of the hyaline spot in space 2 on the forewing above, but this character may be absent in some individuals.

The genus is represented from north India to China, Malaysia and Celebes.

Key for the separation of the species of *LOTONGUS*

- | | | | |
|---|-----|---|--------------------|
| 1 | (4) | Upperside hindwing unicolorous dark brown. | |
| 2 | (3) | Underside hindwing apical area pale yellowish white. | <i>L. calathus</i> |
| 3 | | Underside hindwing with a pale yellow discal band from the mid dorsum to the mid costa. | <i>L. avesta</i> |
| 4 | | Upperside hindwing basal half pale orange. | <i>L. onara</i> |

Lotongus calathus calathus Hewitson

Plate 47, figure 233 ♂; Plate 48, figure 237 ♀

The White-tipped Palmer

This species is rare in Malaya, although generally distributed in the lowlands throughout the Peninsula. The female is less uncommon than the male.

The dark brown wings are rather long and the forewing apex acute, particularly in the male. In the male the forewing markings comprise yellowish hyaline spots in spaces 2 and 3, two spots in the cell and a non-hyaline yellowish spot in space 1b. In the female the spots are pure white, and the single cell spot is contiguous with spots in spaces 2 and 3; also there may be present one or two subapical spots and a non-hyaline spot in space 1b. On the forewing beneath, in both sexes, there is a pale yellowish spot above the cell spot, and in space 1b a broad whitish streak; on the hindwing the apex is conspicuously whitened.

The species occurs from south Burma to Malaysia, and the Philippines.

The very rare *L. avesta avesta* (Hewitson), which is essentially a Neomalayan insect, has a pale straw coloured hyaline spot in each of spaces 2 and 3 on the forewing. It is known only from lowland forest in the Peninsula.

Genus *Zela* Nicéville

Rather large butterflies, with sombre colouring, and with the hindwing tornal cilia orange. The wings are dark brown above, and, in some species, have white hyaline spots on the forewing. In all the species except *Z. smaradinus*, usually, some orange scaling can be detected near the wing bases on the underside, although it may be very sparse.

The sexes are alike except for the male secondary sexual characters, which differ markedly from one species to another, and are as under:

Z. zeus: Upperside forewing with a broken black seam running from the middle of vein 1b to just beyond the base of space 3, where it meets a glandular patch at the base of space 3. Upperside hindwing with the disc clothed with long, dark brown hairs.

Z. zero: Upperside forewing with a broken whitish seam arranged as in *Z. zeus*. Underside forewing with a black patch of modified scales about the dorsum. Upperside hindwing with a dark brown recumbent hair tuft, turning black outwardly, near the base of the wing.

Z. zenon: Underside forewing with a polished area at the dorsum, and a corresponding smooth area at the costa on the hindwing above. Upperside hindwing also with a conspicuous greyish tuft of recumbent hairs from near the base of the wing.

Z. smaragdinus: Upperside hindwing with a large tuft of black hairs attached below vein 6.

The forewing dorsum is bowed in the male, except in *Z. zeus*.

The genus is distributed from Assam to Malaysia. All the species are very rare in Malaya, where they are confined to lowland forest. As far as Malaya is concerned, *Z. zero* is known only from the Langkawi Islands.

Key for the separation of the species of ZELA

- 1 (6) Thorax and abdomen without green hair-scales.
- 2 (3) Upperside forewing with prominent white hyaline spots in the cell and in spaces 2, 3 and 6. *Z. zeus*
- 3 Upperside forewing hyaline spots obscure or absent.
- 4 (5) Upperside forewing with hyaline spots small and obscure. *Z. zero*
- 5 Upperside forewing hyaline spots obsolete. *Z. zenon*
- 6 Thorax and abdomen with green hair-scales. Wings unmarked, and ♀ with wing bases faintly shaded with bluish green. *Z. smaragdinus*

Genus *Gangara* Moore

The adults are rather large. The pale yellow hyaline spots on the forewing comprise rather rectangular spots in the distal half of the cell and in spaces 2 and 3; subapical spots are present in *G. thyrsis*, and there is a small spot in space 1b in some forms.

In the male of *Gangara* the wing bases above are hairy, and veins 2 and 3 on the hindwing are basally swollen and distorted. The males of *G. thyrsis* and *G. sanguinoculus* have vein 1b (medially) and vein 2 (basally) swollen on the forewing above, and, on the forewing beneath, there is a thick patch of pale yellow recumbent hairs along vein 1b. The male of *G. lebadea* has a large dark discal patch of specialised hair scales on the forewing above, and, on the forewing beneath, there is a long tuft of straw coloured

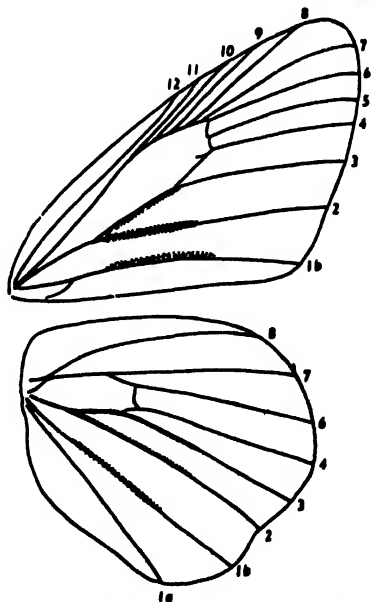


Fig. 155. *Gangara thyrsis* ♂. Venation.

hairs in the basal area of space 1b. On account of these distinctive secondary sexual characters, *G. lebadea* was formerly regarded as representing a distinct genus, *Paduka* Distant.

Gangara is distributed from Ceylon and India to Malaysia, the Philippines and Celebes.

Key for the separation of the species of *GANGARA*

- 1 (4) Underside hindwing without a pale yellow spot at the base of space 7.
- 2 (3) Forewing with pale yellow hyaline subapical spots in spaces 6 to 8. Underside hindwing without a well defined purplish white band from the dorsum to the apex.
G. thyrus (35-37 mm.)
- 3 Forewing without subapical spots, and upperside entirely unmarked in ♂. Underside hindwing with a well defined purplish white band from the dorsum to the apex.
G. lebadea (29-33 mm.)
- 4 Underside hindwing with a pale yellow spot at the base of space 7.
G. sanguinoculus (23-26 mm.)

Gangara thyrus thyrus (Fabricius)

Plate 48, figure 251 ♀

The Giant Redeye

This is one of the largest Malayan Hesperids and is rather rare. The wings are deep brown above, and the pale yellow hyaline spots on the forewing comprise a large spot in the distal part of the cell, a similar large spot in space 2, a smaller one in space 3, and small subapical spots in spaces 6 to 8, of which that in space 6 is moved out towards the termen. The paler underside has pale bluish scaling in the apical area of the forewing, and on the hindwing, where it forms three or four obscure transverse bands. The sexes are alike, except for the swollen veins and hair patches in the male.

The blood-red larva is entirely covered with a loose, filamentous, white waxy material, which is rubbed off when the insect is handled. It lives in a rolled-up leaf of the food plant, which is usually Banana, but larvae are found occasionally on coconut and *Eugeissona tristis* (bertam palm). The pupa has the head dark, the thorax and wing cases light green, and the abdomen light yellowish brown. Pupation takes place between leaves of the food plant, and the pupa makes a rattling noise when disturbed.

The insect is confined to the lowlands, and the butterfly may be taken at flowers at dusk, and, occasionally, it visits the lights in houses. The species is distributed from Ceylon and India to Malaysia, the Philippines and Celebes.

G. sanguinoculus (Martin) is smaller than *G. thyrus* (forewing length about 25 mm.) ; it lacks the apical spots on the forewing, and has a prominent pale yellow spot in the basal area of the hindwing beneath. It is a rare insect restricted to Neomalaya.

G. lebadea lebadea (Hewitson) is intermediate in size between its two congeners. The male is unmarked above, while the female has the usual yellow hyaline spots in the cell and in spaces 2 and 3 on the

forewing, but is without subapical spots. Both sexes of *G. lebadea* are easily recognised by the rather broad purplish white stripe across the disc of the hindwing and the orange tornal cilia on the same wing. The species occurs from Ceylon and India to Malaysia, and is usually taken in secondary growth on the plains in the Peninsula.

Genus *Erionota* Mabille

Hindwing cell much longer than in *Gangara*, in *E. harmachis* equal to half the length of the wing.

Large butterflies, with the upperside dark brown, and with the pale yellow hyaline spots on the forewing usually separated. The underside is paler and without additional markings, except in *E. sybirita*.

E. thrax and *E. torus* are well known, as their larvae live in the rolled-up strips of banana leaves. The genus is distributed from India and China through the Archipelago to the Moluccas.

(Basic literature: Evans, 1941*b*.)

Key for the separation of the species of *ERIONOTA*

- 1 (2) Forewing with a compact pale orange-yellow area comprising spots in the distal half of the cell and in spaces 1b, 2 and 3. Only the ♀ known.
E. harmachis (21.0-25.0 mm.)
- 2 Forewing with separated pale yellow spots.
- 3 (8) Forewing without subapical spots. Underside hindwing without dark spots.
- 4 (7) Forewing longer than 30 mm. Upperside forewing apex usually paler, especially in the ♂, but the pale area is not sharply defined. Antennae with the proximal half or two-thirds of the club white.
- 5 (6) Forewing apex rounded and termen convex. Forewing vein 1b much shorter than hindwing vein 7. Upperside forewing spot in space 2 with the outer edge excavate, and the spot in space 3 rhomboidal and shaped like a parallelogram.
E. torus (30.0-36.0 mm.)
- 6 Forewing apex acute and termen straight. Forewing vein 1b and hindwing vein 7 of equal length. Upperside forewing spot in space 2 with its outer edge not excavate, or only slightly so, and the spot in space 3 triangular.
E. thrax (31.0-37.0 mm.)
- 7 Forewing less than 30 mm. ♂ upperside forewing apex with a sharply defined white patch. Antennal club entirely white above.
E. acrolencus (25.0-27.0 mm.)
- 8 Forewing with three subapical spots. Underside hindwing with dark spots in the discal area.
E. sybirita (28.0-31.0 mm.)

Erionota thrax thrax (Linnaeus)

Plate 48, figure 252 ♂; genitalia, Plate 19, figure 305

The Banana Skipper

The "Banana Skipper" is one of the largest of the Malayan Hesperids, having a forewing length of about 32 to 37 mm. The wings are dark brown above, and the forewing has three prominent separated yellow hyaline spots, one in the cell near the distal end and overlapping the larger spot in space 2, and a smaller triangular spot in the middle of space 3. The underside has the costal half of the forewing and the whole of the hindwing dusted with pale buff.

Hitherto, this species has been confused with the very similar *E. torus* Evans, but the two differ, not only as stated in the key, but in the male genitalia (Plate 19, figs. 304, 305). The species are almost equally

common on the plains in Malaya, but, while *E. thrax* occurs from Sikkim to Siam and through the Archipelago as far east as the Moluccas, *E. torus* is restricted to the Asiatic mainland, ranging from Sikkim to south China, Burma and Malaya.

It is not yet known how these species differ in life history, and the following account probably applies to both. The ova are usually deposited on the leaves of banana, coconut or sugar palm, and apparently a single egg is placed on each leaf. The pale green larva is clothed with short silky hairs, and is covered with a white powdery substance which is a waste product of its metabolism. The larva rolls up the leaf from the tip along the mid-vein, and lives in the shelter so constructed for the duration of the larval stage. The larva feeds from one edge of the leaf, and fresh food is obtained by taking in another roll. These curled leaves are often conspicuous on banana plants in villages near the edge of the forest. Pupation takes place in the rolled leaf, and the pupa is long, slender and covered with the white powder mentioned above. The pupa is very sensitive to movement, and wriggles violently on slight provocation. Emergence of the imago takes place within a fortnight.

The butterflies are not as common as might be anticipated from the abundance of the larvae. They are not on the wing during the day, but may be taken at flowers in gardens at dusk. Occasionally they are attracted by the lights of dwelling houses. In the Peninsula a natural check on the larvae is a small parasitic wasp (Braconidae) known as *Apanteles erionotae* Walker.

In general, *E. acroleucus apex* Semper is rarer than the afore-mentioned species throughout its range, which extends from India to Indo-China, Malaysia, the Philippines and Celebes. It is smaller than *E. thrax*, with a forewing length of about 28 mm., and the male has a distinct whitened apical patch on the forewing above. The female appears to be separable from *E. thrax* only by its smaller size.

The very rare *E. sybirita* (Hewitson) is about the size of *E. acroleucus* but is easily recognised by the forewing subapical spots, and the dark discal spotting on the hindwing beneath; in the male, only the base of the antennal club is white. The species is known only from south Burma, Siam, Malaya and Borneo. It is found in lowland forest, as is the even rarer Neomalayan *E. harmachis* (Hewitson), with a compact orange-yellow forewing band, and of which only the female is known.

Genus *Ge* Nicéville

Antennae longer than half the length of the forewing.

The genus comprises a single species, *G. geta* Nicéville. The wings are deep purple-brown above, unmarked in the male except for a circular patch of recumbent blackish hairs (which are paler basally), at the base of space 2 on the forewing, but with rather obscure, small, pale yellow,

hyaline spots in spaces 2, 3, 6 and 7 on the forewing in the female. There is a patch of rather long, silky hairscales overlying the hindwing cell in both sexes, and, as usual, these are shorter and sparser in the female. On the underside of the forewing, the dorsal area is broadly paler and of a distinct ochreous hue. (Genitalia, Plate 20, fig. 306.)

The butterfly is rather rare in secondary growth in the Malayan lowlands. The species is distributed from south Burma to Malaysia.

Genus *Matapa* Moore

The genus is remarkable in that the hindwing cell is acutely produced towards the origin of vein 4.

The male has an arcuate brand on the forewing above, extending from the middle of vein 1b to below the base of space 3, although the brand is shorter in *M. sasivarna*, where it does not reach vein 1b. The brand is greyish brown, narrow and obscure in *M. aria*, whitish, prominent, comparatively broad and strongly arcuate in *M. druna*, greyish, shorter and obscure in *M. sasivarna*, and black and narrow in *M. cresta*.

The genus is represented from Ceylon and India to China, Malaysia, the Philippines and Celebes.

Key for the separation of the species of MATAPA

- 1 (6) Underside forewing apex not paler than the rest of the wing.
- 2 (3) Hindwing cilia very pale yellow. Abdomen with tip brown, or may be greyish in ♀.
M. aria (17.0-18.5 mm.)
- 3 Hindwing cilia orange-yellow.
- 4 (5) Abdomen with tip brown, or may be greyish in ♀. *M. druna* (19.0-20.0 mm.)
- 5 Abdomen with tip orange-yellow. *M. sasivarna* (20.0-21.0 mm.)
- 6 Underside forewing apex broadly paler. Hindwing cilia and tip of abdomen orange-yellow. *M. cresta* (23.0-24.0 mm.)

Matapa aria (Moore)

Plate 48, figure 238 ♂

The Common Redeye

Above, the wings are rather dark buff brown, with the hindwing cilia greyish white, tinged with yellow; the underside is more ochreous brown. The male may be recognised by the obscure, oblique, slightly bowed brand in spaces 1b and 2 on the upperside of the forewing. The eyes are red, and the abdomen is unicolorous with the wings.

The butterfly is uncommon in Malaya, where it occurs in primary and secondary forest on the lowlands.

The larva is whitish, with a yellow head, and slightly marked with black on the mouth. The food plant is bamboo.

The species is distributed from Ceylon and India through Malaysia to the Philippines.

The other *Matapa* species are larger in size, but similar in facies to *M. aria*, and all have the tornal cilia of the hindwing distinctly yellow. *M. druna* (Moore) has the abdomen entirely brown as in *M. aria*, but,

in *M. sasivarna* (Moore) and *M. cresta* Evans, the tip of the abdomen is orange-yellow. The last-named species is distinctive in that the forewing beneath has the apex and dorsum pale greyish brown. All the species are rare in the lowlands of Malaya. *M. sasivarna* is distributed from India to Malaya and Sumatra, *M. cresta* occurs also in Borneo, while *M. druna* extends to Java.

Genus *Unkana* Distant

Adults rather large (forewing 21 mm. in *U. mythea* and 27 and 31 mm. respectively in the male and female of *U. ambasa*), and with elongate wings. The wings are dark brown, the forewing with hyaline spots (pale yellow in the male and white in the female), and the hindwing with a large white discal area in the female of *U. ambasa*. On the hindwing beneath there is a prominent white area in both species.

The genus is distributed from south Burma to Malaysia and the Philippines.

Key for the separation of the species of *UNKANA*

- 1 (2) Underside hindwing with a broad white discal band extending from vein 1b to the costa.
- 2 Underside hindwing with the whitened area extending from the base to the termen.

U. mythea
U. ambasa

Unkana ambasa batara Distant

Plate 48, figures 241 ♂, 242 and 243 ♀

The Hoary Palmer

Formerly known as *Unkana attina* (Hewitson). A large butterfly, with dark brown wings, and the forewing with a hyaline spot in the cell, decreasing post-discal spots in spaces 2, 3, 4 and 5 and subapical spots in spaces 6, 7 and 8. On the underside, the forewing is partially whitened between the veins, and the whole of the hindwing except the tornus is strongly whitened. The hyaline spots are pale yellow in the male and white in the female, and, in the latter sex, the basal two-thirds of the hindwing above is whitened.

The pale green larva has a black or dark brown head, and lives in the rolled-up leaves of *Pandanus fascicularis* and *Psychotria viridiflora*. The bone-coloured pupa, which is surrounded by a white powdery substance in a rolled-up leaf, is remarkable for the long proboscis which projects considerably beyond the abdomen (figs. 140 and 141).

The butterfly is found in open country and lowland forest, and is often taken at flowers at dusk. The species is distributed from Bengal (Teesta Valley) to Malaysia and the Philippines.

The very rare *U. mythea mythea* (Hewitson) is easily recognised by the broad white discal band on the hindwing beneath. It appears to be confined to lowland forest in Malaya, and the female is unknown to us. The species ranges from south Burma to Neomalaya and Nias. The genus *Zea* Distant was founded on *U. mythea*.

Genus *Hidari* Distant

The adults are rather large, and the elongate wings are dark brown above (more reddish in the female), with separated pale yellow hyaline spots on the forewing, and a semihyaline spot in space 1b. The female is appreciably larger than the male.

Distributed from North India to Malaysia.

Key for the separation of the species of *HIDARI*

- 1 (2) Underside hindwing not striate.
- 2 Underside hindwing evenly striate.

H. irava
H. bhawani

Hidari irava (Moore)

Plate 48, figure 253 ♂

The Coconut Skipper

Above, the wings are a rich dark brown, and the pale yellow hyaline spots on the forewing comprise one across the cell and single separated spots in spaces 1b, 2, 3 and 6. On the underside, the apical third of the forewing and the entire hindwing are pale buff brown, with a faint purple wash; the disc of the forewing is dark brown, and the hindwing has a few small obscure post-discal spots.

The larva is pale yellowish green, with a dark brown lateral stripe and a reddish-brown head. It feeds on the coconut palm and bamboo, and occasionally occurs in sufficient numbers to cause considerable defoliation of the palm trees. Pupation takes place in a rolled-up leaf of some other plant. The reddish-brown pupa has a dark brown lateral line, and the proboscis is not as long as the abdomen; the pupa is covered with a white powdery excretory substance as in the case of *Erionota thrax*.

H. irava is one of the commonest Malayan species of Hesperiid, and the butterfly is taken at flowers in gardens and villages during the half-hour preceding dusk. Sometimes it is attracted to the lights of dwelling houses.

The species occurs from north India to Malaysia, and is usually found wherever the coconut is cultivated.

The very rare *H. bhawani* Nicéville has not been found south of the Langkawi Islands; it is easily distinguished from *H. irava* by the striated underside, and by the crescentic spot in space 2 on the forewing.

Genus *Eetion* Nicéville

The genus comprises a single species which ranges from south Burma to Neomalaya. *E. elia* (Hewitson) (Plate 48, figure 244 ♀) is of large size (forewing about 25 mm.), with elongate wings. The wings are dark brown, the forewing with separated white hyaline spots in the cell and in spaces 1b, 2, 3, 4 and 5 (two minute spots), and with subapical spots in spaces 6 to 8, and the hindwing with spots in spaces 1b, 2 and 3 and conjoined spots in spaces 4 and 5. The hindwing beneath has the basal half silvery white below vein 8. The abdomen is dark brown, white-banded above and entirely white beneath.

On the upperside of the forewing, the male has a narrow arcuate whitish brand from just below vein 2 to before the origin of vein 3, and, on the forewing beneath, there is an upturned dark tuft near the base of the dorsum.

The life history is unknown. The butterfly occurs in primary forest on the lowlands in Malaya, but is not common.

Genus *Acerbas* Nicéville

The wings are dark brown above, with white hyaline spots in spaces 2, 3 and 6 to 8 on the forewing, and with a white or whitish discal fascia (broader and clearer in the female) on the hindwing.

A. anthea anthea (Hewitson) and *A. martini* (Distant and Pryer) are quite rare in lowland forest in Malaya. Both species range from south Burma to Neomalaya, and the first-named extends to Java.

Key for the separation of the species of *ACERBAS*

- 1 (2) Upperside forewing without cell spots. Underside hindwing with the white area reaching, or almost reaching, the termen in space 3. *A. anthea*
- 2 Upperside forewing with two cell spots. Underside hindwing white area not extended to the termen. *A. martini*

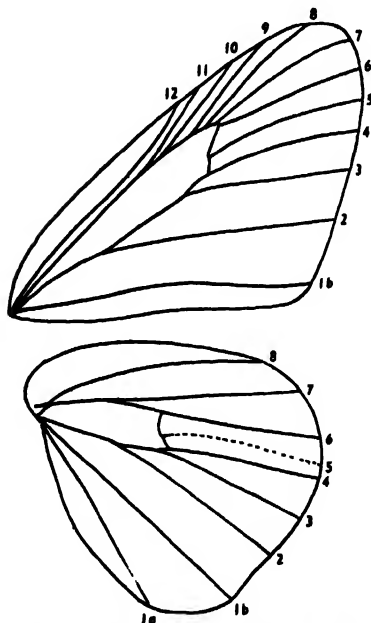


Fig. 156. *Pirdana hyela* ♂. Venation.

Genus *Pirdana* Distant

On the upperside the wing bases are glossed with bluish green, slightly so in the male, and broadly in the female. On the forewing above, the male has an obscure raised seam along the middle third of vein 1b and along the basal half of vein 2.

The larva of *P. hyela* is green with black markings, and feeds on *Dracaena* and *Cordyline rumphii*.

Both the Malayan species are rare, and the butterflies are usually taken in the late afternoon. *P. hyela rudolphii* Elwes and Nicéville, with dark stripes between the veins on the underside, appears to be confined to the hills, while *P. distanti distanti* Staudinger occurs in lowland forest. Both species are distributed from Sikkim to Malaysia, but the first-named occurs also in Celebes.

Key for the separation of the species of *PIRDANA*

- 1 (2) Underside with dark interneural stripes.
- 2 Underside without such stripes.

P. hyela
P. distanti

Taractrocera Group of Genera

In all the species in this and the *Pelopidas* group of genera, vein 5 on the forewing is strongly downcurved at its origin, and is much nearer vein 4 than vein 6.

The wings above are dark brown or black with orange or yellow markings (white in *Taractrocera ardonia*); in general, these markings comprise, on the forewing, a post-discal fascia, subapical spots in spaces 6 to 8, a spot or streak in the cell, and a basal streak along the costa, and, on the hindwing, a post-discal fascia, and sometimes an isolated spot in space 6 and one in the cell. The underside has more extensive yellow or orange colouring.

There is some disparity in size between the species of *Taractrocera* and *Potanthus* and the larger *Telicota* and *Cephrènes* forms.

In the *Taractrocera* group the male genitalia are simple and rather uniform in pattern; usually the uncus is long and tapered, the gnathos is obsolete in all species, and the aedeagus is without cornuti.

Key for the separation of the Genera of the TARACTROCERA Group

- 1 (6) Palpi third segment long and thin.
- 2 (3) Antennal club flattened to a hollow disc; no apiculus. *Taractrocera*
- 3 Antennal club not flattened; apiculus very fine and at an angle to the club.
- 4 (5) Underside forewing without hair scales along vein 12. Forewing vein 2 at origin nearer the base than the end of the cell (i.e., the origin of vein 4), and the origin of vein 4 nearer to vein 3 than to vein 5. Underside forewing with the orange post-discal band entering the cell. *Orvus*
- 5 Underside forewing with the lower edge of the basal portion of vein 12 fringed with hair scales. Forewing vein 2 nearer the end of the cell than the base, and the origin of vein 4 not nearer to vein 3 than to vein 5. Underside forewing with the orange post-discal band not joined to the cell spot. *Potanthus*
- 6 Palpi third segment short and stout.
- 7 (8) Forewing vein 2 nearer the end of the cell (i.e., the origin of vein 4) than the base. ♂ upperside forewing with a narrow oblique brand from the middle of vein 1b to the origin of vein 4 (fig. 157). ♀ upperside markings orange as in the ♂. *Telicota*
- 8 Forewing vein 2 nearer the base than the end of the cell. ♂ upperside forewing without brand. ♀ upperside markings pale yellow, and narrower than in *Telicota*. *Cephrènes*

Genus *Taractrocera* Butler

The *Taractrocera* species, the smallest representatives of the group, are easily recognised by the aberrant antennal club and the absence of an apiculus. The upperside has the usual markings, viz., on the forewing, two streaks near the end of the cell, a costal streak near the base, a post-discal fascia from space 1b to 3, smaller spots in space 4 and 5 moved out of line with the spots below, and three subapical spots; the hindwing has a post-discal fascia and may have a cell spot. The underside is yellow or ochreous dusted, except the dorsal half of the forewing, with the markings as above but more distinct.

All the species are rare in the Peninsula, but *T. ardonia sumatrensis* Evans is least so. In this species the forewing is 10–11 mm., and the markings are white. Corbet found a small colony of this insect in central Pahang; the butterflies were flying by the roadside, in heavy forest, in a

manner reminiscent of *Zizula hylax*. *T. ardonia* occurs in Neomalaya and Celebes.

The genus is distributed from Ceylon and India to China, and through the Archipelago to New Guinea and Australia.

Key for the separation of the species of TARACTROGERA

- 1 (2) Upperside markings white. *T. ardonia* (10.0–11.0 mm.) (Plate 28, figure 1 ♂)
- 2 (5) Upperside markings orange-yellow, forewing discal band not reaching into space 7.
- 3 (4) Upperside forewing with the dark distal margin increasing in width towards the torus, and with the subapical spots almost separated from the post-discal fascia. *T. archus* (10.0–11.0 mm.) (Plate 28, figures 2 ♂, 3 ♀)
- 4 Upperside forewing with the dark distal margin of even width between vein 4 and the torus, and with the subapical spots broadly conjoined with the post-discal fascia. *T. alena* (10.5 mm.) (Plate 28, figure 4 ♂, 5 ♀)
- 5 As (2) above, but forewing discal band reaching into space 7. *T. ziclea*

Genus *Oriens* Evans

The adults are smaller than those of *Telictota* (forewing about 12 mm.); they can be easily separated from this genus and from *Potanthus* on account of the union of the post-discal band with the lower cell-end spot on the upperside of the forewing. The male is without secondary sexual characters.

Distributed from Ceylon and India, through Malaysia to the Philippines and Celebes, and with an isolated species in the Fiji Islands and Samoa.

Key for the separation of the species of *Oriens*

- 1 (2) Underside hindwing dark brown, with the orange-yellow discal band sharply defined, and not edged with black spots. *O. paragola*
- 2 Underside hindwing orange-brown, with the orange-yellow discal band defined by obscure black spotting.
- 3 (4) Upperside forewing with the lower cell-spot separated from the orange-yellow post-discal band by a darkened vein. ♂ uncus curved (Plate 20, figure 307 ♂ genitalia). *O. goloides*
- 4 Upperside forewing with the lower cell-spot not separated from the orange-yellow post-discal band by a darkened vein. ♂ uncus straight (Plate 20, figure 308 ♂ genitalia). *O. gola*

Oriens gola pseudolus (Mabille)

Plate 28, figures 9 ♂, 10 ♀; Plate 48, figure 240 ♂; genitalia, Plate 20, figure 308

The Common Dartlet

Above, the wings are black with orange-yellow post-discal bands, that on the forewing extending from the dorsum almost to the costa (and deeply excavate in space 5), and the hindwing band reaching neither margin. The forewing costa is dusted with orange-yellow. The underside is ochreous, with the upperside markings approximately indicated by rather obscure black spotting.

The butterfly is not uncommon in the plains of Malaya, and is usually taken singly in secondary growth flying around shrubs in bright sunshine.

The species is distributed from Sikkim to Malaysia and the Lesser Sunda Islands.

A very similar species with similar habits is *O. goloides* (Moore). It differs from *O. gola* in that the cell-spot on the upperside of the forewing is separated from the post-discal fascia by a blackened vein. Distributed from Ceylon and India to Malaya (Plate 28, figures 7 & 8).

O. paragola (Nicéville) (Plate 28, figure 6) differs from the preceding species in that the underside is dark brown, with the orange-yellow markings as above. This species also frequents lowland forest, and is essentially Malaysian in distribution.

The larva of *Oriens* has been described as whitish green, with black markings on the white head. The food plants are *Imperata cylindrica* (lalang) and *Paspalum conjugatum*.

Genus *Potanthus* Scudder

This rather large genus was formerly known as *Padraona* Moore.

The adults are small (forewing from 10 to 11 mm. in *P. omaha* and *P. ganda* to 14 mm. in *P. hetaerus*), with the yellow markings characteristic of the *Taractrocera* group, and most of the species are so similar in appearance that examination of the genitalia may be the only certain means of identification. The male genitalia are simple in design, but the ventral aspect of the uncus is a ready means of identification (see Plate 20, figs. 309-318).

The male of *P. rectifasciata* has a dark obscure oblique brand running from vein 1b to vein 4 on the upperside of the forewing. The other Malayan species of *Potanthus* have a short obscure brand lying along the centre of vein 1b on the forewing above. These brands are more easily seen on application of benzene, toluene, petrol, or some similar substance.

The larva of a south Indian species has been found on species of bamboo (*Bambusa*, and *Dendrocalamus*).

The genus is represented from Ceylon and India to China, and through the Archipelago to the Moluccas. The headquarters of the genus appears to be in Malaysia.

Key for the separation of the species of POTANTHUS

- 1 (8) Upperside forewing orange post-discal band with its outer edge deeply excavated. Upperside hindwing veins not dark dusted on the orange band.
- 2 (9) Upperside hindwing post-discal band crescentic, with the outer edge more or less following the wing contour, and continued as a confluent band to vein 7. Upperside forewing post-discal band narrow. ♂ upperside forewing with an obscure, oblique, discal stigma. Forewing 12-13 mm. *P. rectifasciata*
- 3 Upperside hindwing with the post-discal band not above vein 6, but with an isolated spot in space 7. ♂ upperside forewing with a short dark brand along the centre of vein 1b.
- 4 (7) Upperside forewing with the spots in spaces 4 and 5 overlapping the spots below.
- 5 (6) Upperside hindwing with a well defined isolated spot in space 6. Forewing 12-13 mm. *P. jama* (Plate 28, figures 18♂, 19♀)
- 6 Upperside hindwing with a minute spot near the lower margin of space 6. Upperside forewing post-discal band broad and confluent from the dorsum to the costa. Forewing 11-12 mm. *P. confusus* ♂
- 7 Upperside forewing with the spots in spaces 4 and 5 moved out of line with the spots below. Upperside markings narrower than usual. Forewing 12.5-13.5 mm. *P. trachala*

- 8 Upperside forewing orange post-discal band with its outer edge not excavate, or only slightly so. Upperside hindwing veins dark dusted on the orange band (except in *P. juno*, *P. ganda* and *P. confucius* ♀).
- 9 (14) Upperside hindwing veins dark dusted on the orange band (only slightly so in *P. hetaerus*).
- 10 (11) Forewing 10-11.5 mm. Upperside forewing subapical spots separated from the post-discal band. *P. omaha*
- 11 Forewing longer than 12 mm.
- 12 (19) Upperside markings narrow. Upperside forewing post-discal spot in space 1b only about half as wide as that in space 2; subapical spots separated from the post-discal band. Forewing 12.5-13 mm. Mountains. *P. lydia*
- 13 Upperside markings broad. Upperside forewing post-discal spot in space 1b nearly as wide as that in space 2; subapical spots just touching the post-discal band. Forewing 13-14 mm. Plains. *P. hetaerus*
- 14 Upperside hindwing veins not dark dusted on the orange band.
- 15 (16) Upperside forewing subapical spots united or contiguous with the post-discal band. Upperside hindwing may have a small spot in space 6. Forewing 11-12 mm. *P. confucius* ♀
- 16 Upperside forewing subapical spots separated from the post-discal band. Upperside hindwing without a spot in space 6.
- 17 (18) Upperside forewing post-discal spot in space 1b much narrower than that in space 2, narrowing towards vein 2. ♂ forewing apex and hindwing tornus produced. Forewing 11 mm. *P. juno* (Plate 28, figures 14 ♂, 15 ♀)
- 18 Upperside forewing post-discal spot in space 1b nearly as wide as that in space 2. ♂ wings not produced. Forewing 10-11 mm. *P. ganda*

Potanthus omaha omaha (W. H. Edwards)

Plate 28, figure 16 ♂; Plate 47, figure 234 ♂; genitalia, Plate 20, figure 309

The Lesser Dart

This common and widely distributed species was formerly known as *Padraona maesoides* (Butler).

The wings are dark brown above, with bright orange-yellow markings. On the forewing these comprise a post-discal fascia from vein 1b to vein 9, and orange-yellow streaks in the costal region and in the cell. The hindwing has a post-discal fascia from vein 1b to vein 6, a spot in space 7, and a spot in the cell. On both wings the veins are distinctly blackened on the yellow bands. The underside is black, with markings as above, but the costal half of the forewing and the whole of the hindwing are rather heavily dusted with yellowish scales, and there is an additional post-discal spot in space 6 on the hindwing.

P. omaha is common on the plains throughout the Peninsula. Abroad, it is distributed from south Burma to the Philippines and Celebes but it has not been found in Java.

Another common Malayan species of the same size and appearance as *P. omaha* is *P. ganda ganda* (Fruhstorfer) (Plate 28, figure 22 ♂). It differs from the former species in the slightly deeper orange colouring, and in that the veins on the yellow band on the hindwing above are not blackened. Unlike *P. omaha*, *P. ganda* ascends the hills, and is confined to primary forest; it is distributed from Assam to Indo-China and Malaysia.

P. confucius dushta (Fruhstorfer) (Plate 28, figure 17 ♂) is another widely distributed species found at all elevations in Malaya, although it is rarer than the two afore-mentioned species. It is slightly larger, and, in the

male, the markings on the upperside are broader and yellower than in any other species of the genus except *P. pava*. The hindwing post-discal band is without darkened veins, and the female is not easily distinguished from *P. ganda*. The species occurs from Ceylon and India to China, Malaysia (except Borneo) and the Lesser Sunda Islands.

P. trachala tytleri (Evans) (Plate 28, figure 12 ♂, 13 ♀) is larger (forewing 12 to 13 mm.), with the markings narrow, and the outer edge of the discal band on forewing deeply excavate; it is easily separated from all other Malayan species of *Potanthus* in that the spots in space 4 and 5 on the forewing are quite out of line with the spots below. Not rare in the Peninsula at all usual elevations, and found in both primary and secondary forest. Distributed from India and China to Malaysia.

P. rectifasciata (Elwes and Edwards) (Plate 28, figure 11 ♂) is distributed from Sikkim to Indo-China and the mountains of Malaya and is rare. The narrow and keeplly excavate post-discal band on the forewing is composed of spots with the outer edges in line in both sexes. The hindwing post-discal band is distinctive, being crescentic, and running from vein 1b to vein 7 with its outer edge roughly following the wing contour; the veins on the band are not dark-dusted. The male can be recognised by the obscure post-discal stigma on the forewing.

P. lydia fraseri (Evans) (Plate 28, figure 20 ♂) is another montane species which flies from Assam to the Malayan mountains. It has a forewing length of 13 to 14 mm., and the blackish-brown upperside has rather dark and restricted yellowish-orange markings. The spots in spaces 4 and 5 on the forewing are moved towards the termen, but the spot in space 4 slightly overlaps the spot below it. The hindwing veins in the yellow post-discal area are dark-dusted as usual, but the cell spot and the spot in space 7 are very obscure.

P. hetaerus serina (Plötz) (Plate 28, figure 22 ♂) is the largest Malayan species of the genus. It is somewhat similar to *P. lydia*, but the markings are broader, and the outer edges of the spots comprising the forewing post-discal fascia are all more or less in line. Distributed from south Burma to Malaysia, the Philippines and Celebes.

Genus *Tellicota* Moore

The butterflies are rather large (forewing length about 16 to 17 mm.), and the wings are black, with orange-yellow markings arranged as usual in the group. The underside is ochreous yellow, with the markings rather faintly outlined in black. The species are very similar in facies, and the identification of females is difficult. On the upperside of the forewing the male has a grey or bluish grey band from about the middle of vein 1b to just below the origin of vein 4.

The male genitalia are simple, as usual in the *Taractrocera* group, but the shape of the valvae is a good specific character (Plate 20, figs. 319-323).

Distributed from Ceylon and India through the Archipelago to Papua, Australia and the Solomons.

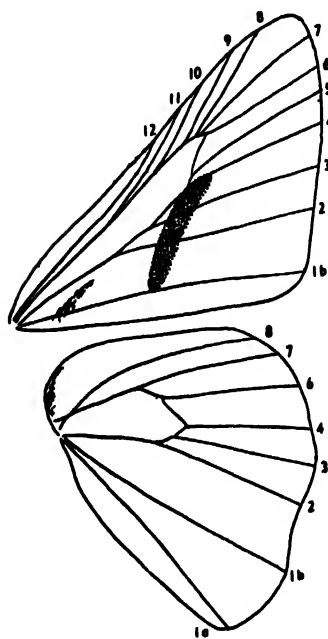


Fig. 157. *Telicota colon* ♂. Venation.

Key for the separation of the species of *TELICOTA*

- 1 (2) Upperside forewing with the veins between the post-discal band and the termen streaked with orange-yellow, but often only slightly so in the female; markings very yellow in the male.
T. colon (14.5–16.0 mm.)
- 2 Upperside forewing with the veins between the post-discal band and the termen not streaked with orange-yellow.
- 3 (8) Upperside hindwing orange-yellow post-discal band continued into space 6. Upperside forewing basal half of space 1b orange in ♂, and rather faintly orange-dusted in ♀.
- 4 (5) ♂ forewing termen straight, and upperside markings orange. ♂ valva without a projecting shoulder on the ventral edge (Plate 20, figure 321 ♂ genitalia.)
T. augias (16.0–17.5 mm.)
- 5 ♂ forewing termen more rounded, and upperside markings yellow. ♂ valva with a projecting shoulder on the ventral edge.
- 6 (7) Shoulder of valva protrudes as a conspicuous sharp triangular point (Plate 20, fig. 322 ♂ genitalia.) *T. linna* (15.0–16.0 mm.)
- 7 Shoulder of valva protrudes as a blunt triangle. *T. ancilla* (14.0–15.0 mm.)
- 8 Upperside hindwing orange-yellow post-discal band not continued above vein 6. Upperside forewing basal half of space 1b faintly orange-dusted in ♂, and entirely dark brown in ♀.
T. ohara (15.0–17.0 mm.)

Telicota augias augias (Linnaeus)

Plate 28, figure 24 ♂; Plate 48, figure 239 ♀

The Palm Dart

The wings are black above, and the orange-yellow post-discal band on the forewing runs from the dorsum to vein 6 and is then bent over and continued along the costal margin to the base; the cell is almost entirely orange-yellow. The hindwing post-discal band extends from vein 1b to space 6, and there is an orange spot in the cell. The veins crossing the yellow areas are blackened, and the cilia are orange-yellow on both wings. On the ochreous yellow underside, the markings are outlined, sometimes faintly, with black. The male has a bluish-grey oblique brand from the middle of vein 1b to vein 4 on the forewing. The female is rather larger, and has duller markings.

T. augias is common in Malaya, and frequents secondary growth and clearings in lowland forest. The butterflies may be taken at flowers. The species is distributed from South Burma and Indo-China through the Archipelago to the Moluccas and Australia.

Another species, *T. linna bina* Evans (Plate 28, figure 26 ♂), is so

similar in both sexes that its separation from *T. augias* is difficult. In general, however, the two differ in that in *T. linna* the small post-discal spots in spaces 4 and 5 on the forewing are distinctly out of line with the spots below. A further species, *T. ancilla bambusae* Moore, differs from *T. linna* as shown in the key.

T. ohara jix Evans (Plate 28, figures 27 ♂, 28 ♀) is usually darker than the above-mentioned species, and differs further as shown in the key. The forewing post-discal spots in spaces 4 and 5 are usually out of line with the spots below, as in *T. linna*, and the male brand is narrower and more obscure than in *T. augias* and *T. linna*.

T. colon stinga Evans (Plate 28, figures 21 ♂, 25 ♀) is the most easily recognised species, as the orange-yellow colour of the post-discal band on the forewing is continued along the veins towards the termen, although to a much lesser extent in the female. The bluish-grey brand on the forewing in the male is paler and more conspicuous than in the other species.

The four last-mentioned species are found in lowland forest and, except *T. ancilla bambusae*, are not uncommon. The larvae of *Telicota* are pale green, with a blackish head, and the food plants include *Oryza sativa* (padi), *Saccharum officinarum* (sugar palm), *Imperata cylindrica* (lalang), *Cocos nucifera* (coconut) and *Calamus* (rotang). Pupation takes place between two leaves sewn together.

T. ancilla and *T. colon* are distributed from Ceylon through the Archipelago to New Guinea and Australia, and, in the case of the latter species, eastwards to the Bismarck Archipelago and the Solomon Islands. *T. ohara* is distributed from Sikkim to Formosa, and through the Archipelago to New Guinea, the Bismarcks and Australia. *T. linna* has a more restricted distribution from India and China to Java and Borneo.

Genus *Cephrenes* Waterhouse and Lyell

The adults are larger than *Telicota*, which they closely resemble (forewing about 17 mm. but some females may be larger), but the male is without a brand, and the female has paler, narrower and more obscure markings.

C. chrysozona niasica (Plötz) is rare in the cultivated lowlands of Malaya, and is swift in flight and difficult to capture. The underside is ochreous, with a reddish hue in the male, and with the markings outlined with black dots; in the female the underside is greyish ochreous, with the markings clearly defined (Plate 28, figures 29 ♂, 31 ♀).

The larva is green, with the white head margined and marked with black, and is found on palms, especially *Cocos nucifera* and *Calamus* (rotang).

C. chrysozona, which is better known by its invalid name *C. palmarum* (Moore), is widely distributed, ranging from India to Malaysia, the Philippines and Celebes. Other species of *Cephrenes* occur in the more easterly part of the Archipelago, in Queensland and in the Solomon Islands.

Pelopidas Group of Genera

Adults of moderate size with elongate wings. In all the species there is an internal veinlet entering the cell from just above the origin of vein 3 on the forewing, and vein 1a of the hindwing is longer than vein 2. As in the *Taractrocer* group, vein 5 on the forewing is downcurved at its origin, and this character is a useful means of separating species of the *Pelopidas* group from the rather similarly marked *Isma* forms.

The wings are dark brown, and the forewing has hyaline spots in the cell (usually), in spaces 2, 3 and 4, and in spaces 6 to 8; the hindwing may have a hyaline spot in the cell and a few post-discal spots. Often the underside is overlaid with ochreous scaling. *Iton semamora* is aberrant in that the tornal area of the hindwing is white.

The butterflies are usually taken at flowers during sunshine.

Key for the separation of the Genera of the PELOPIDAS Group

- 1 (12) Forewing vein 2 nearer the end of the cell (i.e., the origin of vein 4) than the base. Hindwing not white or white-marked.
- 2 (3) Antennae very short, about two-fifths the length of the forewing. Apiculus very short. Mid tibiae not spined. *Parnara*
- 3 Antennae longer than in *Parnara*, but not more than half the length of the forewing. Apiculus normal.
- 4 (7) Antennae less than half the length of the forewing. Forewing with the origin of vein 2 usually opposite the origin of vein 11.
- 5 (6) Mid tibiae not spined. Underside hindwing without a spot in the cell. *Borbo*
- 6 Mid tibiae heavily spined (fig. 158). Underside hindwing with a spot in the cell when the markings are fully developed. *Pelopidas*
- 7 Antennae, at least in ♂, about half the length of the forewing. Forewing with the origin of vein 2 nearer the base of the wing than the origin of vein 11 (fig. 159). Underside hindwing without a cell spot.
- 8 (9) Antennal club obtuse. Mid tibiae not spined. Upperside hindwing with hyaline spots. *Polytremis*
- 9 Antennal club angled. Hindwing without spots.
- 10 (11) Mid tibiae heavily spined. ♂ upperside hindwing with a black hair tuft overlying the cell. *Baoris*
- 11 Mid tibiae not spined. ♂ without such a tuft. *Caloris*
- 12 Forewing vein 2 nearer to the base than in the above genera. Hindwing predominantly white, and the cell entirely white on the underside. *Iton*

Genus *Parnara* Moore

The *Parnara* species can be readily recognised by the very short antennae.

The wings above are brown, with a slight golden sheen, the forewing with white hyaline post-discal spots in spaces 2 to 4 and subapical dots in spaces 6 to 8, and the hindwing, usually, with post-discal spots in spaces 2, 3, 4 and 5. The underside has pale ochreous scaling.

The male is without secondary sexual characters.

Distributed in Africa, and from Ceylon and China to the Moluccas and Australia.

Key for the separation of the species of PARNARA

Upperside hindwing with the small white post-discal spots faint and rather diffuse in *P. naso* and well defined in *P. guttatus* and *P. panga*. The upperside is darkest in *P. guttatus*.

- 1 (2) ♂ valva more or less uniform in width, and with the inner edge straight (Plate 20, figure 325 ♂ genitalia). ♂ forewing 16 mm. Upperside deeper purple brown and more strongly purple washed than in the other species. *P. guttatus* (15.5-16.5 mm.)

- 2 ♂ valva not as above. ♂ forewing 14 to 15 mm.
 3 (4) ♂ Inner edge of valva concave below the projecting shoulder (Plate 21, figure 326 ♂ genitalia). Upperside usually with a more golden sheen than in *P. naso* *P. gunga* (13.0-14.5 mm.)
 4 ♂ Inner edge of valva strongly convex (Plate 20, figure 324 ♂ genitalia). *P. naso* (14.5-15.5 mm.)

Parnara naso bada (Moore)

Plate 48, figure 245 ♂; genitalia, Plate 20, figure 324

The African Straight Swift

This insect is one of the three species of Hesperiidæ common to tropical Africa and tropical Asia, and the species was first described by Fabricius in 1798 from a specimen taken on Mauritius by Daldorff. In the Oriental Region, *P. naso* occurs as far east as Australia and the Moluccas.

The species has been described under the generic diagnosis, and it differs from its very similar congeners in the rather different wing colour and in that the hindwing spots are smaller and more irregular. It is difficult, however, to separate the species with certainty except by examination of the male genitalia. The butterfly is not uncommon throughout the Peninsula in lowland forest. *P. guttatus apostata* (Snellen) is hardly rarer, but ascends to higher altitudes.

As *P. naso* and *P. guttatus* fly together in India and Malaysia, they have been much confused in the past, and it is difficult to decide to which species any observations on the early stages refer. It is probable that the larvae are similar, and one of them has been described as green or greenish white, with a dark dorsal streak, and the head dark brown. The larva lives between the lengthwise sewn leaves of such plants as padi (*Oryza sativa*), sugar cane (*Saccharum officinarum*), maize (*Zea mays*), *Bambusa* and *Colocasia esculenta*. Pupation takes place in a cocoon between the leaves of the food plant.

Genus Borbo Evans

Closely allied to *Pelopidas*. The male is without secondary sexual characters.

The genus has numerous African representatives, and, in the Oriental Region, is found from Ceylon, India and China as far east as Australia and the Solomon Islands. As yet only a single species has been found in the Malay Peninsula.

Borbo cinnara (Wallace)

Plate 48, figure 246 ♂; genitalia, Plate 21, figure 327

The Formosan Swift

The wings are brown above, with a golden hue, and with greenish hairs in the basal areas; on the forewing there is a yellow non-hyaline spot in space 1b, and there are decreasing hyaline spots in spaces 2 to 4 and 6 to 8, while a few hyaline spots may be faintly visible on the hind-

wing. The underside has greenish scaling, and there are spots in spaces 2, 3 and 6 on the hindwing.

B. cinnara is common in forest land in Malaya, and occurs at all usual elevations. Abroad, it is found from Ceylon to south China, Australia and the New Hebrides.

A smaller and neater species, which occurs from India and China to Malaysia, Celebes and the Moluccas, is *B. bevani* (Moore). This butterfly has the upperside more golden brown, the spotting more distinct, although the spot in space 1b on the forewing above is faint or absent, and, unlike *B. cinnara*, the hindwing is not produced at the tornus. It is curious that *B. bevani* has not yet been taken in Malaya, and it should be sought in secondary growth and open forest in the northern states.

Genus *Pelopidas* Walker

The adults are rather variable in size and colour. The wings are dark brown, mostly with a slightly golden hue, and the wing bases are clothed with greenish hair in some species. The underside is paler and with ochreous scaling in *P. mathias*, *P. agna* and *P. thrax*, and to a lesser degree in *P. conjuncta*. The forewing has the usual hyaline spots in the cell and in spaces 2 to 4 and 6 to 8, but the hindwing is rarely spotted on the upperside in the Malayan forms.

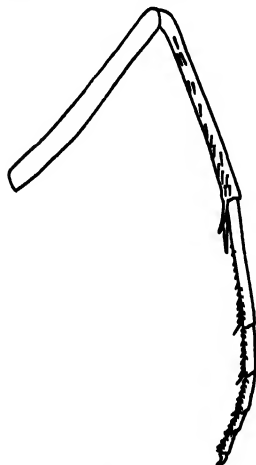


Fig. 158. *Pelopidas conjuncta* ♂. Mid-leg. Showing spines on the tibia.

In the males of *P. mathias*, *P. agna* and *P. thrax*, there is a narrow oblique brand in space 1b on the upperside of the forewing. The uncus is long and tapered, and the gnathos obsolete: allied species can be separated by the contour of the valva (Plate 21, figs. 328-331).

The genus is represented in Africa, and throughout the Indo-Australian Region.

Key for the separation of the species of *PELOPIDAS*

- 1 (4) Large, forewing longer than 20 mm. ♂ upperside forewing without a discal stigma.
 - P. assamensis* (25.5-26.5 mm.)
- 2 (3) Upperside forewing hyaline spots pure white; cell-spots more or less conjoined.
 - P. conjuncta* (21.5-23.5 mm.)
- 3 Upperside forewing hyaline spots pale yellowish white; cell-spots separate.
- 4 Smaller, forewing less than 20 mm. ♂ upperside forewing with a narrow discal stigma from the middle of vein 1b to the spot in space 2.
 - P. thrax* (16.5 mm.)
- 5 (6) Underside hindwing overlaid with ochreous scales; no spots.
- 6 Underside hindwing overlaid with pale greenish scales; small spots always present.
- 7 (8) ♂ upperside forewing brand meets vein 1b on the basal side of the origin of vein 2.
 - ♀ upperside forewing the continuation of the line through the cell-spots meets vein 1b just below the inner edge of the larger spot in space 1b.
 - P. mathias* (15.0-16.0 mm.)

- 8 ♂ upperside forewing brand meets vein 1b immediately below the origin of vein 2, or nearer the termen. ♀ upperside forewing the continuation of the line through the cell-spots meets vein 1b on the basal side of the larger spot in space 1b.
P. agna (16.5-18.0 mm.)

***Pelopidas mathias mathias* (Fabricius)**

Plate 48, figure 247 ♂

The Small Branded Swift

The upperside is brown, with a golden sheen, and the wing bases are greenish. The forewing has the usual white hyaline post-discal spots in spaces 2 to 4 and 6 to 8 (decreasing in size in that order), and two cell-spots. Very rarely, the female has post-discal spots on the hindwing. On the forewing the male has a narrow oblique brand running from the spot in space 2 towards the mid-dorsum, and the female has additional white post-discal spots in space 1b, a minute upper spot (which may be obsolete), and a larger triangular lower spot. The underside has a rather glazed appearance, with the forewing spotting as above, except that the male has a single diffuse white spot in space 1b; the hindwing has small post-discal spots in spaces 2 to 5 in addition to a small cell-spot.

The larva is pale yellowish green, with white dots and pale subdorsal lines. In the grown larva, the head is pale green with a lateral red streak. Unlike most Hesperids, the larva lives free, at least during the last stage. The food plants include padi (*Oryza sativa*), lalang grass (*Imperata cylindrica*), sugar cane (*Saccharum officinarum*) and citronella (*Cymbopogon nardus*). The pupa is pale green, with longitudinal white lines.

P. mathias occurs from Ceylon to New Guinea, and is found throughout Malaya at all usual elevations.

P. agna agna (Moore) is very similar to *P. mathias* in appearance and habits, and differs as shown in the key. Usually, *P. agna* has a forewing length of 18 mm. as against 17 mm. or less in *P. mathias*. It has a wider distribution than its congener, and is found as far east as the Solomon Islands.

P. thrax is distributed from Africa and through the Middle East to India and Burma. Although quite similar to *P. mathias* and *P. agna*, *P. thrax flava* (Evans) has more restricted spotting both above and below.

P. conjuncta conjuncta (Herrich-Schäffer) is a larger, browner butterfly (forewing 21 mm.), with larger pale yellow hyaline spots, and a spot in space 1b on the forewing in both sexes. The larva is pale green, with darker subdorsal and lateral lines, and the head is white with black spots. Occasionally the larva becomes a pest to rice cultivators, and other food plants include *Zea mays*, *Saccharum officinarum*, *Andropogon* and *Bambusa*. Distributed from Ceylon and India, through Malaysia to the Philippines and Lesser Sunda Islands.

P. assamensis (Nicéville) is still larger (forewing 23-25 mm.); the upperside is dark purple-brown, with white hyaline spots, and there are two

non-hyaline white spots in space 1b on the forewing beneath. The antennae are conspicuously whitened below the base of the club. *P. assamensis* is an Indian species of which the Peninsula is the most southerly extension of its range. It is rather rare in lowland primary forest.

Genus *Polytremis* Mabille

The adults of this genus are not very uniform in size or appearance; they are liable to be confused with *Caltoris*, but there are spots on the hindwing above (sometimes absent in *P. minuta*). The males are without secondary sexual characters. In this genus, as in the two following genera, the uncus and gnathos comprise paired, rather heavily chitinated lobes, the aedeagus is furnished with cornuti and, usually, the shape of the valvae affords a means of identification.

The genus is essentially Chinese and Indian in distribution, but *P. lubricans* occurs as far east as Timor and the Sula Islands.

Key for the separation of the species of *POLYTREMIS*

- 1 (2) Forewing 11.0 mm. Upperside dark purple-brown, and wing bases not paler; no spot in space 1b on the forewing. *P. minuta* (11.0-11.5 mm.)
- 2 Forewing longer than 15.0 mm. Upperside with wing bases paler, and a spot in space 1b on the forewing.
- 3 (4) Underside hindwing with small separated spots in spaces 2, 3 (usually), 4 and 5. *P. lubricans* (16.0-18.0 mm.)
- 4 Underside hindwing with spots in spaces 2 and 3, and a single large spot in spaces 4 and 5.
- 5 (6) Upperside hindwing tornal cilia pale ochreous. Upperside wing bases clothed with ochreous brown hairs. Tegumen with two pairs of horns (Plate 21, fig. 333 ♂ genitalia). *P. eliola* (19.0-20.0 mm.)
- 6 Upperside hindwing tornal cilia white. Upperside wing bases clothed with darker brown hairs. Tegumen without horns (Plate 21, fig. 332 ♂ genitalia). *P. discreta* (17.5-19.5 mm.)

Polytremis lubricans lubricans (Herrich-Schäffer)

Plate 48, figure 248 ♀

The Contiguous Swift

This is probably the commonest Malayan species of the *Pelopidas* group; it was redescribed under the name of *contigua* Mabille, doubtless on account of the cell spots on the forewing being contiguous and not well separated or conjoined as in most other species.

The butterfly is dark golden brown above, with the wing bases overlaid with paler hair-scales. In addition to the cell spots, there are pale yellow hyaline spots on the forewing in spaces 1b to 4 and in spaces 6 to 8; the hindwing has a small spot in each of the spaces 4 and 5. The underside has ochreous scaling, and is spotted as above.

P. lubricans is a common butterfly in secondary jungle and in open spaces in woods, and is confined to the lowlands.

The larva is green, with numerous dark dots and yellow transverse folds; the head is yellowish brown with darker margin and markings. The food plant is *Imperata cylindrica* (alang).

The species is distributed from India to south China, and through Malaysia to the Sula Islands and Timor.

P. eltola and *P. discreta*, which are both confined to the forested hills and are not found south of the Peninsula, are dark purple-brown above with the basal areas paler. On the forewing the hyaline spots are arranged as in *P. lubricans*, but the cell-spots are conjoined, and the hindwing has single spots in spaces 2 and 3, as well as a large spot in spaces 4 and 5. *P. eltola corbeti* Evans has the spotting more restricted and the hindwing cilia pale ochreous, while, in *P. discreta discreta* (Elwes & Edwards), the hindwing cilia are pure white. Both species are rare in Malaya, and *P. discreta* is known only from the Larut Hills.

Very few examples of *P. minuta* (Evans) are known, although its range extends from Assam to Malaya. The butterfly is small, and the wings are dark purple-brown with small spots, those on the hindwing tending towards obsolescence.

Genus *Baoris* Moore

The adults are large (forewing 17 mm. or longer), the wings dark brown with a ferruginous hue, and with the usual hyaline post-discal spots in spaces 2, 3 and 4 (usually), and in spaces 6 to 8 on the forewing, where there may be one, two or no cell-spots. The purple-brown underside is slightly glazed.

In the male there is a black recumbent hair tuft overlying a scent pouch in the cell on the hindwing above, and, on the forewing beneath, below the cubitus and vein 2, is a grey vitreous dorsal area in the centre of which, and lying along vein 1b, is an oval brand.

Distributed from Ceylon and India through Malaysia to the Philippines.

Key for the separation of the species of *BAORIS*

- 1 (4) ♂ valva terminating in a pointed projection.
- 2 (3) ♂ aedeagus with a series of minute spines on the inner edge, and with two processes with larger spines in the distal region (Plate 21, figure 334 ♂ genitalia). Forewing subapical spots present in spaces 6, 7 and 8; ♂ with two cell spots often present, and always two cell spots present in ♀. *B. farri* (18.0-20.5 mm.)
- 3 ♂ aedeagus inner edge not spined but with a distal area of minute spines on the left side (Plate 21, figure 336 ♂ genitalia). Forewing subapical spots usually obsolete; usually, only the lower cell spot present, but the cell spots may be obsolete in both sexes. *B. penicillata* (19.0-20.5 mm.)
- 4 ♂ valva not as above (Plate 21, figure 335 ♂ genitalia). Forewing subapical spots present in spaces 6 and 7; ♂ usually with only the lower cell spot present but both are present in ♀. *B. acia* (19.5-21.5 mm.)

Baoris ocella (Hewitson)

Plate 48, figure 249 ♂

The Paintbrush Swift

The three Malayan species of *Baoris* are so similar that the generic description given above completely covers them all, although the upper-side spotting is more restricted in *B. penicillata*. The males of *Baoris* can be readily recognised by the prominent black tuft in the cell of the hind-

wing, but the only certain means of identifying the species is by examination of the male genitalia.

Baoris oceia can be easily recognised if the male genitalia are extruded, for the valva lacks the pointed terminal process found in the other species. *B. penicillata chapmani* Evans differs from *B. farri farri* (Moore) in the more simple ornamentation in the distal end of the aedeagus.

B. penicillata is distributed from Ceylon and India to Indo-China, Malaya and Borneo, *B. farri* ranges from India to Malaya and Sumatra and is commonest in Kedawi as far as the Peninsula is concerned, while *B. oceia* is found from Burma, through Malaysia, to the Philippines. It is only in the narrow belt between south Burma and Malaya that the three species have been found together. The butterflies frequent open country as well as primary forest, and only *B. farri* ascends the hills.

Genus *Caltoris* Swinhoe

The butterflies are rather uniform in appearance, being dark brown above with the usual spotting on the forewing (the spot in space 1b usually present only in the female). The underside is dark brown, with the forewing marked as above. Some of the species are so similar in appearance that examination of the genitalia is the only certain means of identification.

The male of *C. brunnea* has a pale, oblique, discal stigma on the forewing above, and, in *C. plebeia*, there is an upturned tuft of hairs on the dorsum near the base on the forewing beneath. The male genitalia resemble those of *Polytremis* in general design, and, although rather uniform in pattern, they differ sufficiently from one species to another to serve as an important means of identification.

The genus is represented from India and China through the Archipelago to New Guinea, the Bismarcks and the Solomon Islands.

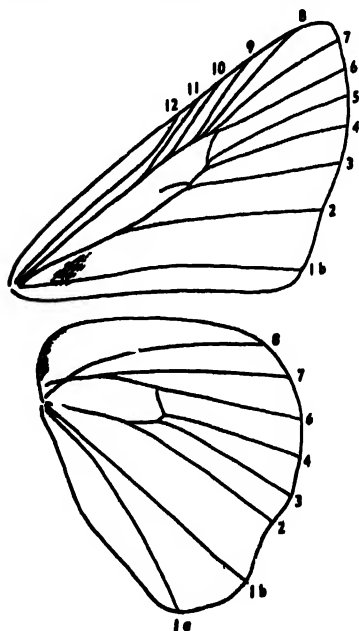


Fig. 159. *Caltoris tulsi* ♂. Venation.

Key for the separation of the species of *CALTORIS*

- 1 (10) Upperside forewing with cell spots.
- 2 (5) Upperside forewing upper cell-spot nearly as large as the lower cell spot.
- 3 (4) Underside dark brown. ♂ upperside forewing with a pale oblique discal stigma, and without a spot in space 1b. *C. brunnea* (18.5–21.0 mm.)

- 4 Underside more yellowish brown. ♂ upperside forewing without a discal stigma, but usually with a spot in space 1b (genitalia, Plate 21, fig. 339).
C. bromus (16.5-20.5 mm.)
- 5 Upperside forewing upper cell spot small or obsolete.
- 6 (7) Underside ferruginous or purple-brown. Upperside forewing upper cell spot small or obsolete. Upperside forewing spot in space 1b usually absent in ♂ and small in ♀ (genitalia, Plate 21, fig. 640).
C. cormasa (17.0-18.0 mm.)
- 7 Underside dark brown. Upperside forewing upper cell spot small.
- 8 (9) Upperside forewing spot in space 1b present but small in both sexes (genitalia, Plate 21, fig. 337).
C. sirus (19.5-20.5 mm.)
- 9 Upperside forewing spot in space 1b obsolete in ♂ and small or obsolete in ♀.
C. cahira (16.0-17.5 mm.)
- 10 Upperside forewing without cell spots.
- 11 (12) Underside hindwing with a pale purplish white discal area. *C. tulsi* (18.5-19.0 mm.)
- 12 Underside hindwing without a pale area.
- 13 (14) Underside hindwing deep purple brown. Forewing 16 mm. ♂ underside forewing with an upturned hair tuft on the dorsum near the base.
C. plebeia (16.0-17.0 mm.)
- 14 Underside hindwing not as above. Forewing 17 mm. and longer. ♂ underside forewing without a tuft.
- 15 (16) Underside hindwing ferruginous and without greenish scaling. ♂ upperside forewing without a spot in space 1b.
C. malaya (17.0-17.5 mm.)
- 16 Underside hindwing overlaid with ochreous green scaling. ♂ upperside forewing with a pale yellow spot in the lower half of space 1b. Forewing apex more pointed, and termen excavate at vein 2 in both sexes.
C. philippina (18.0-19.5 mm.)

Caltoris cahira austeni (Moore)

Plate 48, figure 250 ♂; genitalia, Plate 21, figure 338

Austen's Swift

The wings above are dark brown, and the forewing has white hyaline spots in spaces 2, 3 and 4, subapical spots in spaces 6 and 7, and two separate spots in the cell. Usually, the female has a spot in the lower half of space 1b on the forewing. The underside is dark brown, and rather faintly overlaid with ochreous scaling. The species is found in open country on the lowlands, and is not common. Abroad, it extends to Sikkim and China.

C. cormasa (Hewitson) is found in the forested lowlands, and ranges from India to Malaysia and the Philippines. It has smaller subapical spotting, and the spot in space 2 on the forewing is rather larger and more rectangular than in *C. cahira*; the underside is distinctly more ferruginous than in allied species.

The male of *C. brunnea caesi* (Nicéville) can be recognised by the pale oblique band on the upperside of the forewing. The larva has been described as yellowish green with yellow transverse folds, and, in the grown larva, the head is pearly grey with dark streaks and dots. It feeds on *Bambusa* and *Imperata cylindrica* (alang).

The other species of *Caltoris* deserving of mention differ from those described above in lacking cell spots on the forewing. *C. tulsi tulsi* (Nicéville) has, on the underside, a pale purplish-white area in the costal area of the forewing, and a larger similarly coloured area in the centre of the hindwing. The species is confined to the forested hills in Malaya, and, abroad, it flies from India and China to Malaysia.

C. malaya and *C. philippina* have the underside unicolorous, and they differ chiefly in that *C. philippina philippina* (Herrich-Schaffer) has the underside more ochreous and the forewing excavate at vein 2. Both are lowland species, and *C. malaya* (Evans) seems to be confined to the forest. *C. malaya* is practically restricted to south Burma and Malaysia, while *C. philippina* is distributed from Ceylon and India through the Archipelago to New Guinea, the Bismarcks and the Solomon Islands, but appears to be absent from the Large Sunda Islands.

C. kumara (Moore) (Plate 21, figure 342 ♂ genitalia), which closely resembles *C. malaya* (Plate 21, figure 341 ♂ genitalia), but has somewhat different male genitalia, ranges from Ceylon and India to Java and Lombok, although it has not yet been found in Malaya and Sumatra.

Genus *Iton* Nicéville

Adults larger than usual in the *Pelopidas* group. Although the forewing has the usual hyaline spotting found in the group, the extensive white area on the hindwing renders the *Iton* species easily recognisable. The different pattern of the male genitalia shows that *Iton* is far removed from the other genera of the *Pelopidas* group.

The only Malayan species is *I. semamora semamora* (Moore), which has a forewing length of 20 to 21 mm. The forewing is dark brown above, with white hyaline post-discal spots in spaces 2, 3 and 4, and subapical dots in spaces 6 to 8; the tornal half of the hindwing is white. On the underside the forewing is marked as above, and the apical area is slightly whitened; the hindwing is entirely white below the radius and vein 7, and the termen has a few black marginal spots from space 1b to the apex. On the underside of the forewing, the male has a black tuft of upturned hairs in the basal half of the dorsum.

I. semamora is found in the forested lowlands in Malaya, and its range abroad (Sikkim to Indo-China and Neomalaya) represents the distribution of the genus.

PART III

A SYNONYMIC LIST OF THE BUTTERFLIES OF THE MALAY PENINSULA, WITH PARTICULARS OF THEIR DISTRIBUTION AND REFERENCES TO FIGURES IN DISTANT'S *RHOPALOCERA MALAYANA* (1882-1886)

THE following list includes the generic, specific and subspecific names of all the species of *Rhopalocera* known to occur in the Malay Peninsula south of the Siamese frontier. In order to facilitate reference to the original descriptions, the name of the describer (bracketed, where necessary, in accordance with the International Rules as explained on page 21), is followed by the date of the original description. With this information, the exact reference to the literature can be found from W. F. Kirby, 1871, *A Synonymic Catalogue of Diurnal Lepidoptera* (London), and the *Supplement* published in 1877, and from the *Zoological Record*, which has been published annually in London since 1864.

To obviate any confusion, certain displaced generic names used in standard works during the last forty years are placed in brackets following the correct name in the present catalogue. In order to regularise the use of certain well known, but nomenclaturally invalid, generic names, the International Commission on Zoological Nomenclature has rendered *Opinions* suspending the rules, and, in such cases, the number of the genus in the *Official List of Generic Names in Zoology* is given in the Appendix (p. 496).

In the distributions given in the right-hand column on each page :

L. refers to the Langkawi Islands, off the north-west coast of Malaya.

K. to Perlis and that part of the state of Kedah north of the Sungei Kedah on the mainland.

M. to Malaya proper, that is, that part of British Malaya exclusive of the specialised areas in Kedah and Perlis, and of the islands of the Langkawi and Tioman groups and of Singapore.

- (1) denotes the coastal mangrove association ;
- (2) secondary plant growth on the plains ;
- (3) primary forest below 2500 feet ;
- (4) primary forest above 2500 feet ;
- (5) indicates the few species which have been recorded from altitudes above 5000 feet. (British Malaya has less than 500 square miles, that is, less than one per cent. of its total area, above 5000 feet.)

S. refers to Singapore Island. A number of species were recorded from Singapore by the old authors, and there are many old specimens labelled "Singapore" in the British Museum; such records may be based on captures made, in fact, many miles from Singapore, or on species no longer occurring there. Species that have not been taken again on the Island within the last thirty years are denoted by [S].

T. refers to the east coast islands of the Tioman group.

In the last decade or so, forest clearing has taken place on Cameron Highlands, and it should soon be possible to collect further data for the distribution class of species found in secondary growth at altitudes above 2500 feet.

Apart from those marked with an asterisk (*), authentic Malayan specimens of all the species included in the following list have been examined by Corbet, with the exception of *Euthalia djata* Distant & Pryer, *Surendra todara* Moore and *Pratapa maculatus* (Hewitson), which species, however, were represented by Malayan specimens in the Selangor Museum and were vouched for by Pendlebury.

The species or subspecies marked with an asterisk (*) in the list are those for which the evidence of occurrence in Malaya is not entirely satisfactory and confirmation is desirable: with the exception of *Amnosia decora* Doubleday and *Coladenia agni* (Nicéville), the specimen or specimens on which these records are based have been examined by Corbet. About twenty other species recorded from Malaya are omitted from the list as the evidence for their occurrence in the Peninsula is considered to be entirely unsatisfactory.

In the notes following the catalogue, particulars are given of all the known specimens of the unique or very rare species. The notes are indicated by the numerals (1) to (107) set in column down the left side of the list. Most of the nomenclature changes adopted in the list have been explained already in various publications by the authors.

Dates are given in square brackets [] when the date was not given in the publication in question, but has been deduced from external evidence.

The name of each Malayan species or subspecies is followed by a reference to any figures in Distant's *Rhopalocera Malayana* (plates are referred to by roman numerals and text figures are given in the so-called arabic numerals). Where these figures represent holotypes, they are given in italic type.

The synonyms given refer to names of forms of which Malaya is the type locality. In the comparatively few instances where the synonyms are not based on specimens of Malayan provenance, these names are placed in square brackets [].

All the names in this catalogue have been checked by reference to the original works, and the *International Rules of Zoological Nomenclature*

have been followed in their entirety, except that no attempt has been made to alter the spelling of any trivial names which may be regarded as adjectives.

[At the Copenhagen Colloquium on Nomenclature certain recommendations were made, and approved by the International Congress of Zoology in 1953, in respect of diacritic marks and the correction of misspelt names. These I have applied. The decision that adjectival specific names must agree in gender with their generic names has not been consistently applied because of the uncertainties as to the genders of many of the latter.—Ed.]

Family PAPILIONIDAE		
<i>Trogonoptera</i> Rippon, 1889		
<i>T. brookiana</i> (Wallace, 1855) <i>albescens</i> Rothschild, 1895— xxviiA.4 ♀, xxviiB.1 ♂		M (3, 4, north of Johore)
<i>T. brookiana trogon</i> (Vollenhoeven, 1860)		Johore
<i>Troides</i> Hübner [1819]		
<i>T. helena</i> (Linnaeus, 1758) <i>cerberus</i> (C. & R. Felder, 1864)—xxvii.3 ♂, 4 ♀, 2 ♀		L.K.M (2, 3). S
<i>T. aeacus</i> (C. & R. Felder, 1860) <i>thomsonii</i> (Bates, 1875)— xxviiA.5 ♂; fig. 106 ♀		M (3)
<i>T. amphrysus</i> (Cramer, 1779) <i>ruficollis</i> (Butler, 1877)— xxvii.1 ♂, xxviiA.1 ♀; fig. 107 ♀		L.K.M (3, 4) S
<i>T. cuneifera</i> (Oberthür, 1879) <i>peninsulæ</i> (Pendlebury, 1936)		M (4)
<i>Atrophaneura</i> Reakirt [1865]		
<i>A. priapus</i> (Boisduval, 1836) <i>egertoni</i> (Distant, 1886)— xl.ii.10 ♀		M (3, 4)
<i>A. varuna</i> (White, 1842) <i>varuna</i> (White, 1842)—xxxi.3 ♂, 4 ♀		L.M (3, 4)
<i>A. nox</i> (Swainson, 1822) <i>erebus</i> (Wallace, 1865)—xxxi.1 ♂, 2 ♀		M (3)
<i>A. neptunus</i> (Guérin-Ménéville, 1840) <i>neptunus</i> (Guérin-Ménéville, 1840)—xxxiii.5 ♂, 6 ♀		L.K.M (3)
<i>A. coon</i> (Fabricius, 1793) <i>doubledayi</i> (Wallace, 1865)— xxxiii.4 ♀		L.K.M (3)
†(1) <i>A. aristolochiae</i> (Fabricius, 1775) <i>asteris</i> (Rothschild, 1908)—xxxi.6 ♂, 7 ♀		L.K.M (2, 3). S.T
<i>Chilasa</i> Moore, 1881		
<i>C. agestor</i> (G. R. Gray, 1831) <i>agestor</i> (G. R. Gray, 1831)		M (4, 5)
<i>C. slateri</i> (Hewitson, 1859) <i>perses</i> (Nicéville, 1894) [syn. <i>sticheli</i> (Tetens, 1900), <i>persides</i> (Fruhstorfer, 1902)]		M (4)
<i>C. clytia</i> (Linnaeus, 1758) <i>clytia</i> (Linnaeus, 1758)		L.K.
f. <i>dissimilis</i> (Linnaeus, 1758)—xxviiB. 2 ♂. <i>Danaus</i> -like		S (f. <i>dissimilis</i> only)
f. <i>onopape</i> Moore, 1879—xxvii.5 ♂. <i>Euploea</i> -like		

† The numerical prefixes refer to notes at the end of the List.

	<i>C. paradoxa</i> (Zincken-Sommer, 1831) <i>aenigma</i> (Wallace, 1865)—	M (3, 4). S
	f. <i>aenigma</i> (Wallace, 1865)—[syn. <i>butleri</i> (Janson, 1879), <i>distanti</i> (Rothschild, 1895)—xxviiA.6 ♂, <i>nepicula</i> (Rothschild, 1895)—xxvii.6 ♀, <i>haasei</i> (Rothschild, 1895)]. Sexes resemble <i>Euploea mulciber</i>	
	f. <i>aegialus</i> (Distant, 1883)—xxviiB.5 ♂. Sexes resemble <i>Euploea diocletianus</i>	
	<i>C. mahadeva</i> (Moore, 1879) <i>selangoranus</i> (Fruhstorfer, 1901)	L.K.M (4)
	<i>Papilio</i> Linnaeus, 1758	
	<i>P. demoleus</i> Linnaeus, 1758, <i>malayanus</i> Wallace, 1865—xxviiB.6 ♂	L.K.M (1, 2, 3). S
	<i>P. demolion</i> Cramer, 1776, <i>demolion</i> Cramer, 1776—xxviiB.3 ♂	L.M (2, 3, 4). S.T
	<i>P. nephelus</i> Boisduval, 1836, <i>raya</i> Corbet, 1937	L.K
	<i>P. nephelus sunatus</i> Corbet, 1940—xxx.3 ♂, 4 ♀, 5 ♀ (syn. <i>saturus</i> Guérin-Ménéville, 1840, praecoc.)	M (3)
	<i>P. helenus</i> Linnaeus, 1758, <i>helenus</i> Linnaeus, 1758—xxix.3 ♀ (syn. <i>aspadantus</i> Fruhstorfer, 1921)	L.K.M (3, 4, 5). T
	<i>P. iswaroides</i> Fruhstorfer, 1898, <i>curtisi</i> Jordan, 1909	M (4)
	<i>P. iswara</i> White, 1842, <i>iswara</i> White, 1842—xxx.1 ♂, 2 ♀	L.M (3, 4). S
	<i>P. fuscus</i> Goeze, 1779, <i>prexaspes</i> C. & R. Felder, 1864—xxix.2 ♂	K.M (3)
	<i>P. polytes</i> Linnaeus, 1758, <i>romulus</i> Cramer, 1775—xxxiii.7 ♂	L.K.M (2, 3). S.T
	♀-f. <i>cyrus</i> Fabricius, 1793—xxxiii.8 ♀, 9 ♀. Resembles ♂	
	♀-f. <i>polytes</i> Linnaeus, 1758—xxxiii.10 ♀ (syn. <i>neomelanides</i> Fruhstorfer, 1909). Resembles <i>Atrophaneura aristolochiae</i>	
(2)	<i>P. memnon</i> Linnaeus, 1758, <i>agenor</i> Linnaeus, 1758—xxviii.1-4 ♂	L.K.M (2, 3, 4). S.T
	♀-f. <i>esperi</i> Butler, 1877—xxviii.6 ♀. Forewing with a white subapical area and hindwing tailless	
	♀-f. <i>butlerianus</i> Rothschild, 1895—xxviii.7 ♀. Forewing with a white subternal area and hindwing tailless	
	♀-f. <i>distantianus</i> Rothschild, 1895—xxviii.5 ♀. Hindwing tailed	
(*)	<i>P. paris</i> Linnaeus, 1758, <i>paris</i> Linnaeus, 1758	M (3)
	<i>P. palinurus</i> Fabricius, 1787, <i>palinurus</i> Fabricius, 1787—xxxii.4 ♂ (syn. <i>brama</i> Guérin-Ménéville, 1840)	L.K.M (3)
	<i>Graphium</i> Scopoli, 1777	
	<i>G. ageles</i> (Westwood, 1843) <i>iponus</i> (Fruhstorfer, 1902)—xlii.8 ♂	M (3, 4, 5)
	<i>G. aristeus</i> (Stoll, 1780) <i>hermocrates</i> (C. & R. Felder, 1864)—xlii.7 ♂	L.K.Perak
	<i>G. antiphates</i> (Cramer, 1775) <i>itamputi</i> (Butler, 1885)—xxxi.5 ♂	L.K.M. (3). S

- G. payeni* (Boisduval, 1836) *ciminius* (Fruhstorfer, 1909) M (3, 4)
G. empedovana (Corbet, 1941) [syn. *empedocles* (Fabricius, 1787) *pracocc.*] L.M (3)
G. sarpedon (Linnaeus, 1758) *luctatus* (Fruhstorfer, 1907) L.K.M (3, 4). S
 —xxxii.6 ♂
G. doson (C. & R. Felder, 1864) *evemonides* (Honrath, 1884)—fig. 109 ♂ L.K.M (3)
G. doson kajanga (Corbet, 1937) T
G. evemon (Boisduval, 1836) *eventus* (Fruhstorfer, 1908)—xxxii.1 ♂ [syn. *orthia* (Jordan, 1909)] L.K.M (3). S
G. eurypylus (Linnaeus, 1758) *mecisus* (Distant, 1885)—fig. 108 ♂ L.K.M (3)
G. bathycles (Zincken-Sommer, 1831) *bathycloides* (Honrath, 1884)—xxxii.2 ♂ K.M (3)
G. agamemnon (Linnaeus, 1758) *agamemnon* (Linnaeus, 1758)—xxxii.7 ♂ L.K.M (2, 3, 4). S.T
G. aryles (Boisduval, 1836) *aryles* (Boisduval, 1836)—xxxii.5 ♂ [syn. *rama* (C. & R. Felder, 1860), *incertus* (Fruhstorfer, 1899)] L.K.M (3)
G. macareus (Godart, 1819) *perakensis* (Fruhstorfer, 1899) L.K.M (3)
G. ramaceus (Westwood, 1872) *pendleburyi* (Corbet, 1941)—xxviiA.2 ♂, 3 ♀ [syn. *leucothoe* (Westwood, 1844), *pracocc.*, *dealbatus* (Pendlebury, 1939), *praeocc.*] L.M. (3)
G. delessertii (Guérin-Ménéville, 1839) *delessertii* (Guérin-Ménéville, 1839)—xxviiB.4 ♂ L.K.M (3, 4)
G. megarus (Westwood, 1844) *megapenthes* (Fruhstorfer, 1902)—xlii.9 ♂ [syn. *similis* (Lathy, 1899), *praeocc.*] L.K. Perak

Lamproptera G. R. Gray, 1832 (= *Leptocircus* Swainson, 1833)

- L. curius* (Fabricius, 1787) *curius* (Fabricius, 1787)—xlii.1 ♂ L.K.M (3, 4)
L. meges (Zincken-Sommer, 1831) *virescens* (Butler, 1870)—xxxii.3 ♂ L.K.M (3, 4). [S]

Family PIERIDAE

Subfamily PIERINAE

Leptosia Hübner [1819]

- L. nina* (Fabricius, 1793) *malayana* Fruhstorfer, 1910—xxvi.8 ♀ K.M (3)

Delias Hübner [1819]

- D. singhapura* (Wallace, 1867) *singhapura* (Wallace, 1867)—fig. 100 ♂ M (4, 5)
D. georgina (C. & R. Felder, 1861) *keda* Talbot, 1937 Kedah Peak (4)
D. georgina tahamica Rothschild, 1925 Gunong Tahan (5)
D. georgina zenobia Pendlebury, 1939 Fraser's Hill (4, 5)
D. georgina orphne (Wallace, 1867)—fig. 101 ♂ Mount Ophir (4)

- D. belladonna* (Fabricius, 1793) *malayana* Pendlebury, 1933 —fig. 99 ♂ (Sikkim race) M (4, 5)
- D. aglaja* (Linnaeus, 1758) *parthenope* (Wallace, 1867)—xxiv.5 ♂, 6 ♀, fig. 98 ♂ (syn. *distanti* Staudinger, 1889) K.M (4). [S]
- D. acalis* (Godart, 1819) *perakana* Talbot, 1928—xlii.14 ♂ M (4)
- D. nimus* (Wallace, 1867) *nimus* (Wallace, 1867)—xxiv.4 ♂ M (4, 5)
- D. descombesi* (Boisduval, 1836) *eranthos* Fruhstorfer, 1905 —xlii.16 ♂ M (4)
- * (4) *D. agostina* (Hewitson, 1853) *johnsoni* Corbet, 1933 M (4)
- D. baracasa* Semper, 1889, *dives* Nicéville, 1897 M (4)
- D. hyparete* (Linnaeus, 1758) *metarete* Butler, 1877—xxiv.13 ♂, 14 ♀ K.M (2, 3, 4). S
- Prioneris* Wallace, 1867
- P. thestylis* (Doubleday, 1831) *malaccana* Fruhstorfer, 1899 M (3, 4)
- P. philonome* (Boisduval, 1836) *themana* Fruhstorfer, 1903 —xxiv.16 ♂ M (3, 4)
- Pieris* Schrank, 1801
- * (5) *P. canidia* (Linnaeus, 1768) *malayica* Martin, 1909 S
- P. napi* (Linnaeus, 1758) *montana* Verity, 1908 Perak
- Cepora* Scudder, 1875 (= *Huphina* Moore, 1881)
- C. nerissa* (Fabricius, 1775) *dapha* (Moore, 1879) L.K.
- C. nadina* (Lucas, 1852) *andersoni* (Distant, 1885)—xxxiii.2 ♂ M (3, 4)
- (6) *C. iudith* (Fabricius, 1787) *malaya* (Fruhstorfer, 1899)—xxxiii.1 ♂ L.K.M (3). S
- C. iudith talboti* Corbet, 1937 Pulau Tioman
- C. iudith siamensis* (Butler, 1899) (syn. *aora* Pendlebury, 1933) Pulau Aor
- Appias* Hübner [1819]
- A. libythea* (Fabricius, 1775) *olferna* Swinhoe, 1890 M (2). S. Pulau Aor
- A. lyncida* (Cramer, 1777) *vasava* Fruhstorfer, 1910—xxv.4 ♂, 5 ♀, fig. 102 ♂ K.M (3, 4, 5). S
- A. nero* (Fabricius, 1793) *figulina* (Butler, 1867)—xxiv.9 ♂, 10 ♀ L.K.M (3, 4). S
- A. pandione* (Geyer, 1832) *lagela* (Moore, 1879)—xli.11 ♂ (syn. *aornus* Fruhstorfer, 1913) M (3, 4, 5)
- A. lalassis* Grose-Smith, 1887 [syn. *indroides* (Honrath, 1889)] M (3, 4)
- A. albina* (Boisduval, 1836) *albina* (Boisduval, 1836) [syn. *neombo* (Boisduval, 1836)] L.K.M (3, 4)
- A. paulina* (Cramer, 1777) *distanti* (Moore, 1905)—xxv.7 ♂, 6 ♀, 10 ♀ L.K.M (3, 4)
- A. paulina grisea* Moulton, 1923 T
- A. cardena* (Hewitson, 1861) *perakana* (Fruhstorfer, 1902) —xxxiii.3 ♂ M (3, 4, 5)
- A. indra* (Moore, 1857) *plana* Butler, 1877—xxv.9 ♀ L.K.M (3, 4)

Saletara Distant, 1885

S. liberia (Cramer, 1779) *distanti* Butler, 1898—xxvi.1 ♂, 2 ♀ K.M (3). S

Phrissura Butler, 1870 (= *Udaiana* Distant, 1885)

P. aegis (C. & R. Felder, 1861) *cyms* (Hewitson, 1866)—xxvi.5 ♂, 6 ♀ M (3)

P. aegis tiomana Moulton, 1923 T

Ixias Hübner [1819]

I. pyrene (Linnaeus, 1764) *verna* H. Druce, 1874 L.K

I. pyrene birdi Distant, 1883—xxvi.4 ♂ M (3)

I. pyrene alticola Pendlebury, 1933 M (4)

Hebomoia Hübner [1819]

H. glaucippe (Linnaeus, 1758) *aturia* Fruhstorfer, 1910—xxvi.9 ♂ L.K.M (3)

H. glaucippe anomala Pendlebury, 1939 Pulau Aor

Valeria Horsfield, 1829 (= *Pareronia* Bingham, 1907)

V. valeria (Cramer, 1776) *anaïs* (Lesson, 1837)—xxvi.16 ♂ L.K

V. valeria lutescens (Butler, 1879)—xxvi.14 ♂, 12 ♀ [syn. *philomela* (Fabricius, 1793), *praecocc.*] K.M (3). S

Subfamily COLIADINAE

Dercas Doubleday [1847]

D. verhuelli (van der Hoeven, 1839) *herodorus* Fruhstorfer, 1910—xxvi.18 ♂ K.M (3, 4). S

Catopsilia Hübner [1819]

C. pyranthe (Linnaeus, 1758) *pyranthe* (Linnaeus, 1758)—xxv.1 ♀, 2 ♂, xxvi.20 ♀ L.K.M (2). S

(7) *C. pomona* (Fabricius, 1775) *pomona* (Fabricius, 1775) L.K.M (2, 3). S

♂-f. *hilaria* (Stoll, 1781)—xxv.16 ♂

♀-f. *pomona* (Fabricius, 1775)—xxv.15 ♀

In the above forms, the underside has silvery white cell-end spots

♀-f. *catilla* (Cramer, 1779). Resembles ♀-f. *pomona*, but the underside has large blood-red patches on the hindwing

♂-f. *alcmeone* (Cramer, 1777)—xxv.11 ♂

♀-f. *jugurtha* (Cramer, 1777)—xxv.12 ♀

The above two forms are without silvery white spots on the underside

♀-f. *crocale* (Cramer, 1775). As ♀-f. *jugurtha*, but the underside with a black submarginal fascia Kedah only

C. scylla (Linnaeus, 1763) *cornelia* (Fabricius, 1787)—xxiv.1 ♂, 2 ♀ L.K.M (2). S

Eurema Hübner [1819] (= *Terias* Swainson, 1821)

- E. brigitta* (Stoll, 1780) *senna* (C. & R. Felder, 1865) Penang Hill. S
E. hecabe (Linnaeus, 1758) *contubernalis* (Moore, 1886)— L.K.M (1-4). S.T
 xxv.14 ♀, xxvi.10 ♂, 11 ♀, 19 ♂
E. simulatrix (Semper, 1891) *tecnessa* (Nicéville, 1896)— L.K.M (2, 3, 4). S
 xxvi.3 ♂
E. blanda (Boisduval, 1836) *snelleni* (Moore, 1907)— L.K.M (2, 3, 4).
 xxvi.15 ♂, 17 ♂ S.T
E. andersonii (Moore, 1886) *andersonii* (Moore, 1886) L.K.M (3, 4). S
E. lacteola (Distant, 1886) *lacteola* (Distant, 1886)—fig. M (3). [S]
 129 ♀
E. ada (Distant & Pryer, 1887) *iona* Talbot, 1939— K.M (3, 4). S
 xxvi.13 ♂
E. sari (Horsfield, 1829) *sodalis* (Moore, 1886)—xxv.3 ♂, K.M (3, 4). S
 xxvi.7 ♀
E. tilaha (Horsfield, 1829) *nicevillei* (Butler, 1898)— L.M (3). T
 xxv.8 ♂

Gandaca Moore, 1907

- G. harina* (Horsfield, 1829) *distanti* Moore, 1906— L.K.M (2, 3, 4). S
 xxv.13 ♂
G. harina aora Moulton, 1923 T

Family DANAIIDAE

Danaus Kluk, 1802 (= *Danaida* Latreille, 1804)

- D. chrysippus* (Linnaeus, 1758) *chrysippus* (Linnaeus, 1758) L.K. Penang, S
 —i.10 ♀ (syn. *margarita* (Röbbsen, 1926)
D. chrysippus alciippoides (Moore, 1883)—xl.13 ♂ M (2), except Pen-
 ang and Singa-
 pore
D. genutia (Cramer, 1779) *genutia* (Cramer, 1779)—ii.2 ♂
 [syn. *plexippus* Linnaeus 1758, transferred by
 decision of International Commission on Zoo-
 logical Nomenclature to the American Monarch
 Butterfly]
D. genutia intermedia (Moore, 1883)—ii.3 ♂ [syn. M (2). S
connectens (Moulton, 1921)]
D. melanippus (Cramer, 1777) *hegesippus* (Cramer, 1777)— L.K.M (2, 3). S
 ii.1 ♂
D. affinis (Fabricius, 1775) *malayana* (Fruhstorfer, 1899)— M (1)
 xlii.11 ♀
D. hamata (Macleay, 1826) *septentrionis* (Butler, 1874)— L.K.M (3, 4)
 i.9 ♂
D. gautama (Moore, 1877) *gautama* (Moore, 1877) L
 * (8) *D. limniace* (Cramer, 1775) *leopardus* (Butler, 1866) M (3). [S]
D. aspasia (Fabricius, 1787) *aspasia* (Fabricius, 1787)— L.K.M (3, 4). S
 i.7 ♂
D. agleoides (C. & R. Felder, 1860) *agleoides* (C. & R. M (2, 3, 4). S
 Felder, 1860)—i.5 ♀ [syn. *eryx* (Fabricius, 1798),
praeocc.]
D. aglea (Stoll, 1782) *melanoides* (Moore, 1883) L.K.M (3)

	<i>D. melaneus</i> (Cramer, 1775) <i>sinopion</i> (Fruhstorfer, 1910)— i.6 ♂	M (3, 4). [S]
	<i>D. sita</i> (Kollar, 1844) <i>ethologa</i> (Swinhoe, 1899)—xli.15 ♂	K.M (4, 5)
	<i>D. vulgaris</i> (Butler, 1874) <i>macrina</i> (Fruhstorfer, 1904)— i.8 ♂	L.K.M (2, 3, 4). S
	<i>D. similis</i> (Linnaeus, 1758) <i>persimilis</i> (Moore, 1879)	L.K
	<i>D. juvenia</i> (Cramer, 1777) <i>sitah</i> (Fruhstorfer, 1904)— xxxix.4 ♀	Perhentian Is., Trengganu, T
	<i>Ideopsis</i> Moore, 1857	
	<i>I. gaura</i> (Horsfield, 1829) <i>perakana</i> Fruhstorfer, 1899— i.3 ♂, 4 ♀	L.M (3, 4). S. T
	<i>Idea</i> Fabricius, 1807 (- <i>Hestia</i> Hübner, 1816)	
	<i>I. lynceus</i> (Drury, 1773) <i>lynceus</i> (Drury, 1773)—i.2 ♀ [syn. <i>reinwardti</i> (Moore, 1883)]	L.M (3, 4)
	<i>I. jasonia</i> (Westwood, 1848) <i>logani</i> (Moore, 1883) [syn. <i>donovani</i> (Moore, 1883)]	M (3, 4). S
	<i>I. hypermnestra</i> (Westwood, 1848) <i>linteata</i> (Butler, 1877) — i.1 ♀	L.M (3)
	<i>I. leuconoe</i> Erichson, 1834, <i>chersonesia</i> (Fruhstorfer, 1898)— xxxix.3 ♀	M (1). S.T
	<i>Euploea</i> Fabricius, 1807	
	<i>E. modesta</i> Butler, 1866, <i>modesta</i> Butler, 1866	L.K.M (3)
	<i>E. modesta tiomana</i> Corbet, 1937	T
	<i>E. crameri</i> Lucas, 1853 <i>bremeri</i> C. & R. Felder, 1860— ii.4 ♂, xxxix.1 ♂ [syn. <i>marsdeni</i> (Moore, 1883)]	L.K.M (2). S
(9)	<i>E. redtenbacheri</i> C. & R. Felder, 1865, <i>paraclauidina</i> Pendlebury 1939	L.K
	<i>E. redtenbacheri malayica</i> (Butler, 1878)—ii.7 ♂	K.M (3, 4). S
(10)	<i>E. core</i> (Cramer, 1780) <i>wheeleri</i> Talbot, 1940—v.9 ♂	K
	<i>E. algea</i> (Godart, 1819) <i>menetriesii</i> C. & R. Felder, 1860— iii.9 ♂, 10 ♀ (syn. <i>pimvilli</i> Butler, 1877)	L.K.M. (3, 4)
	<i>E. doubledayi</i> C. & R. Felder, 1865, <i>evalida</i> (Swinhoe, 1899) (syn. <i>monticola</i> Moulton, 1921)	L K M (4)
	<i>E. eyndhovii</i> C. & R. Felder, 1865, <i>gardineri</i> Fruhstorfer, 1898—iii.4 ♂, 5 ♀	L.K.M (3, 4). S
	<i>E. sylvester</i> (Fabricius, 1793) <i>harrisii</i> C. & R. Felder, 1865 —iii.3 ♂	L.K.M (3, 4). [S]
	<i>E. mulciber</i> (Cramer, 1777) <i>mulciber</i> (Cramer, 1777)— ii.8 ♂, 9 ♀, iii.1 ♂, 2 ♀ [syn. <i>claudius</i> (Fabricius, 1787)]	L.K.M (3, 4). S
	<i>E. tulliolus</i> (Fabricius, 1793) <i>ledererii</i> C. & R. Felder, 1860 —ii.10 ♂	L.K.M (3, 4). S
	<i>E. phaeareta</i> (Schaller, 1785) <i>castelnaui</i> C. & R. Felder. 1865—ii.6 ♀ (syn. <i>phoebus</i> Butler, 1866)	L.K.M (1, 3). S
	<i>E. midamus</i> (Linnaeus, 1758) <i>chloe</i> (Guérin-Ménéville, 1843)—iv.2 ♂ (syn. <i>dejeani</i> Distant, 1882—iv.1 ♂, <i>clerckii</i> Moore, 1883)	L M (3)
	<i>E. midamus singapura</i> (Moore, 1883)—ii.5 ♀	S.T
	<i>E. klugii</i> Moore, 1857, <i>erichsonii</i> C. & R. Felder, 1865— v.8 ♂ [syn. <i>crassa</i> Butler, 1866]	L.K

- E. leucostictos* (Gmelin, 1790) *leucogonis* (Butler, 1877)—
iii.6 ♂, 7 ♀ [syn. *lazulina* (Moore, 1883)] L.K.M (3, 4). S
E. diocletianus (Fabricius, 1793) *diocletianus* (Fabricius,
1793)—iv.4 ♂, 5 ♀ [syn. *radamanthus* (Fabricius,
1793)] L.K.M (2, 3, 4). S

Family SATYRIDAE

Ypthima Hübner, 1818

- * (11) *Y. ceylonica* Hewitson, 1865 *hubneri* Kirby, 1871—vii.5 ♂ L.K.M (2, 3). S
Y. philomela (Linnaeus, 1763) *philomela* (Linnaeus, 1763) Perak
Y. fasciata Hewitson, 1865, *torone* Fruhstorfer, 1911—fig. K.M (3, 4). S
122
Y. baldus (Fabricius, 1775) *newboldi* Distant, 1882— L.K.M (2, 3). S
iv.6 ♀, vi.9 ♂
Y. savara Grose-Smith, 1887, *savara* Grose-Smith, 1887 M (3)
Y. pandocus Moore, 1857 *corticaria* Butler, 1877—vi.8 ♂ M (3, 4, 5). S
(syn. *emporiatidis* Martin, 1929)
Y. pandocus tahananensis Pendlebury, 1933 Gunong Tahan (5)

Erites Westwood [1851]

- E. argentina* Butler, 1868, *delia* Martin, 1909 K.M (3)
E. angularis Moore, 1879, *angularis* Moore, 1879—v.3 ♂ K.M (3)
E. elegans Butler, 1868, *distincta* Martin, 1909 M (3)

Lethe Hübner [1819]

- L. confusa* Aurivillius, 1898, *enima* Fruhstorfer, 1911 M (3, 4)
L. europa (Fabricius, 1775) *malaya* Corbet, 1941—v.5 ♂, K.M (2). S
6 ♀
L. minerva (Fabricius, 1775) *minerva* (Fabricius, 1775)— K.M (3)
xxxvi.8 ♂
L. vindhya (C. & R. Felder, 1859) *luaba* Corbet, 1941 M (4)
L. sinorix (Hewitson, 1863) *vanda* Corbet, 1941 M (4)
L. mekara (Moore, 1857) *gopaka* Fruhstorfer, 1911— K.M (3)
xxxix.9 ♂
L. chandica (Moore, 1857) *namura* Fruhstorfer, 1911 K.M (4)
L. verma (Kollar, 1844) *robinsoni* Pendlebury, 1933 M (4)

Neorina Westwood [1850]

- N. lowii* (Doubleday [1849]) *neophyta* Fruhstorfer, 1911— K.M (3, 4)
xxxvii.3 ♂

Ethope Moore, 1866 (= *Anadebis* Butler, 1867)

- (12) *E. diademoides* (Moore, 1879) *hislopi* Corbet 1948 K

Coelites Westwood [1850]

- C. epiminthia* Westwood [1851] *epiminthia* Westwood L.K.M (3). [S]
[1851]—xix.8 ♀
C. euptychioides C. & R. Felder, 1867 *humilis* Butler, 1867 K.M (3)
—fig. 15 ♀

(13)

Mycalesis Hübner, 1818

- M. anapita* Moore, 1857, *anapita* Moore, 1857—xxxix.8 ♂ K.M (3)
M. mnasicles Hewitson, 1864, *perna* Fruhstorfer, 1906—xxxvii.5 ♀ K.M (3)
M. janardana Moore, 1857, *sagittigera* Fruhstorfer, 1908—v.2 ♂ M (2, 3). T
M. perseus (Fabricius, 1775) *cephesus* Butler, 1867—vii.7 ♂ L.M. (3). S
M. perseoides (Moore, 1892) *perseoides* (Moore, 1892) L.K
M. mineus (Linnaeus, 1758) *macromalayana* Fruhstorfer, 1912—iv.7 ♂, 13 ♂, 14 ♀ L.K.M (2, 3). S
(14) *M. intermedia* (Moore, 1892) *intermedia* (Moore, 1892) L.K
M. horsfieldi (Moore, 1892) *hermana* Fruhstorfer, 1908 L.K.M (3). T
M. visala Moore, 1857, *phamis* Talbot & Corbet, 1939 M (3). S
M. fuscum (C. & R. Felder, 1860) *fuscum* (C. & R. Felder, 1860)—v.1 ♀ M (3). S
M. orseis Hewitson, 1864, *nautilus* Butler, 1867—v.4 ♂, xl.4 ♂ M (3, 4). S
M. anaxias Hewitson, 1862, *bisaltia* Fruhstorfer, 1911—xxxvi.7 ♂ M (4)
M. anaxioides Marshall, 1883 K.M (3, 4)
M. maianeas Hewitson, 1864, *maianeas* Hewitson, 1864—vii.4 ♀ K.M (3, 4)
M. dohertyi Elwes, 1891, *dohertyi* Elwes, 1891 M (3)
M. orontis Hewitson, 1864, *ustulata* Distant, 1885—xli.16 ♂ K.M (3)

Orsotriaena Wallengren, 1858

- O. medus* (Fabricius, 1775) *cinerea* (Butler, 1867)—iv.8 ♂ L.K.M (2, 3). S.T

Ragadia Westwood [1851]

- R. crisilda* Hewitson, 1862, *critolina* Evans, 1923 M (4, 5)
R. makuta (Horsfield, 1829) *siponta* Fruhstorfer, 1911—xix.7 ♀ K.M (3, 4)

Melanitis Fabricius, 1807

- M. leda* (Linnaeus, 1758) *leda* (Linnaeus, 1758)—iv.9 ♀, 10 ♂, 11 ♀, 12 ♀ L.K.M (2, 3, 4). S
M. phedima (Cramer, 1780) *abdullae* Distant, 1883—xix.3 ♂, xxxix.2 K.M (2, 3). [S]
M. zitenius (Herbst, 1796) *auletes* Fruhstorfer, 1908—xxxviii.2 ♂ K.M (3, 4)

Elymnias Hübner, 1818

- E. panthera* (Fabricius 1787) *panthera* (Fabricius, 1787)—vi.4 ♂, 5 ♀ (syn. *lutescens* Butler, 1867) L.M (3). S
E. dara Distant & Pryer, 1887, *darina* Fruhstorfer, 1907 M (3)
E. palna (Westwood [1851]) *hanitschi* Martin, 1909 M (4, 5)
E. hypermnestra (Linnaeus, 1758) *tinctoria* Moore, 1879 L.K
E. hypermnestra discrepans Distant, 1882—vi.2 ♂, 3 ♀ Province Wellesley, Penang

<i>E. hypermnestra beatrice</i> Fruhstorfer, 1902—vi.1 ♀, ix.1 ♀ (syn. <i>ornamenta</i> Fruhstorfer, 1907)	M (2, 3, south of Penang and north of Johore) Johore, S T
<i>E. hypermnestra agina</i> Fruhstorfer, 1901	
<i>E. hypermnestra nimota</i> Corbet, 1937	
<i>E. nesaea</i> (Linnaeus, 1764) <i>lioneli</i> Fruhstorfer, 1907—ix.2 ♂	L.M (3, 4). [S]
<i>E. casiphona</i> Geyer, 1827, <i>saileri</i> Distant, 1882—ix.3 ♂	L.M (3)
<i>E. kamara</i> Moore, 1857, <i>erinyes</i> Nicéville, 1895	M (3)
<i>E. kuenstleri</i> Honrath, 1885, <i>kuenstleri</i> Honrath, 1885—xli.9 ♀	M (3, 4)
<i>E. harterti</i> Honrath 1889, <i>harterti</i> Honrath, 1889	M (3, 4)
<i>E. penanga</i> (Westwood [1851]) <i>penanga</i> (Westwood [1851])—vii.6 ♂ [syn. <i>mehida</i> (Hewitson, 1863)]	L.M (3). S
♀-f. <i>penanga</i> (Westwood [1851])—vi.11 ♀. Forewing with a white subapical band	
♀-f. <i>abrisa</i> Distant, 1886—xliii.5 ♀. Forewing unmarked, and hindwing with an obscure, pale bluish, subternal patch (ab. <i>johnsoni</i> Talbot 1929, has this hindwing subternal patch large and white)	
<i>E. esaca</i> (Westwood [1851]) <i>esaca</i> (Westwood [1851])—[syn. <i>godferyi</i> Distant, 1883—xxxix.5 ♀, <i>esacoides</i> (Nicéville, 1892)]	M (3, 4). S
Family AMATHUSIIDAE	
<i>Faunis</i> Hübner [1819]	
<i>F. canens</i> Hübner, 1826, <i>arcesilas</i> Stichel, 1933 [syn. <i>arcesilaus</i> (Fabricius, 1787), <i>praeocc.</i> , <i>laraki</i> Pendlebury, 1933]	L.M (3). S
<i>F. kirata</i> (Nicéville, 1891)—xl.5 ♀	K.M (3)
<i>F. gracilis</i> (Butler, 1867)—viii.1 ♂	M (3, 4)
<i>Melanocyma</i> Westwood, 1858	
<i>M. faunula</i> (Westwood, 1850) <i>faunula</i> (Westwood, 1850)—viii.2 ♀	K.M (3, 4, 5). [S]
<i>Xanthotaenia</i> Westwood, 1858	
<i>X. busiris</i> (Westwood, 1858) <i>busiris</i> (Westwood, 1858)—v.7 ♂	K.M (3, 4). [S]
<i>Tenaris</i> Hübner [1819]	
<i>T. horsfieldi</i> (Swainson, 1820) <i>birchi</i> Distant, 1883—xxxix.7 ♂	M (1, 3, in Johore) [S]
<i>Amathusia</i> Fabricius, 1807	
<i>A. phidippus</i> (Linnaeus, 1763) <i>chersias</i> Fruhstorfer, 1911—vi.6 ♂, 7 ♀ (syn. <i>utana</i> Corbet & Pendlebury, 1936, <i>holmanhanti</i> Corbet & Pendlebury, 1936)	L.K.M (3). S
<i>A. gunneryi</i> Corbet & Pendlebury, 1936	M (2)
<i>A. binghami</i> Fruhstorfer, 1904	M (3)

- A. perakana* Honrath, 1888, *perakana* Honrath, 1888
A. schonbergi Honrath, 1888, *schonbergi* Honrath, 1888
A. ochraceofusca Honrath, 1888, *ochraceofusca* Honrath, 1888
A. masina (Fruhstorfer, 1904) *malaya* Corbet & Pendlebury, 1936

M (3, 4)
M (3, 4)
M (3)
L.M (3)

Amathuxidia Staudinger, 1887

- A. amythaon* (Doubleday, 1847) *dilucida* (Honrath, 1884)—xxxviii.7 ♂

K.M (3, 4)

Zeuxidia Hübner [1826]

- Z. amethystus* Butler, 1865 *amethystus* Butler, 1865—vii.1 ♂, 2 ♀, xxxviii.5 ♂
Z. doubledayi Westwood [1851] *doubledayi* Westwood [1851]—fig. 124 ♂ (syn. *choronesia* Fruhstorfer, 1906—xxxviii.6 ♀)
Z. aurelius (Cramer, 1777) *aurelius* (Cramer, 1777)—xxxvii.1 ♂

L.K.M (3, 4). S
M (3, 4). S
M (3, 4)

Thaumantis Hübner [1826]

- T. noureddin* Westwood [1851] *noureddin* Westwood [1851]—vii.3 ♂, ix.7 ♀
T. odana (Godart, 1819) *pishuna* Fruhstorfer, 1905—xxxvi.3 ♀
T. klugius (Zincken-Sommer, 1831) *lucipor* Westwood [1851]—ix.8 ♂, 9 ♀

M (3). S
K.M (3, 4)
K.M (3). S

Thauria Moore, 1895

- T. aliris* (Westwood, 1858) *pseudaliris* (Butler, 1877)—viii.3 ♂

K.M (3, 4)

Discophora Boisduval, 1836

- D. sondaica* Boisduval, 1836, *despoliata* Stichel, 1902—vii.8 ♂, 9 ♀, xliii.7 ♂
D. timora Westwood [1850] *perakensis* Stichel, 1901—v.10 ♂, 11 ♀
D. necho C. & R. Felder, 1867, *engamon* Fruhstorfer, 1911

K.M (2, 3). S
K.M (2, 3)
M (3)

Enispe Doubleday [1848]

- E. euthymius* (Doubleday, 1845) *corbeti* Pendlebury, 1933

K.M (3, 4)

Family NYMPHALIDAE

(a) Ariadne Group

Ariadne Horsfield, 1829 (= *Ergolis* Boisduval, 1836)

- A. ariadne* (Linnaeus, 1763) *ariadne* (Linnaeus, 1763)—xi.6 ♀
A. merione (Cramer, 1777) *ginosa* (Fruhstorfer, 1912)—xv.6 ♀
A. specularia (Fruhstorfer, 1899) *area* (Fruhstorfer, 1906)
A. isaeus (Wallace, 1869) *isaeus* (Wallace, 1869)—xxxix.6 ♂

L.K.M (2, 3). S
K.M (3, 4)
L
M (3, 4). [S]

M (3). [S]

(d) Cethosia Group

Cethosia Fabricius, 1807

- (18) *C. biblis* (Drury, 1773) *perakana* Fruhstorfer, 1902— M (3, 4). T
xxxviii.3 ♂
C. hypsea Doubleday [1847] *hypsinia* C. & R. Felder, 1867 M (3, 4). S
—viii.6 ♂, 7 ♂, 8 ♀
C. penthesilea (Cramer, 1777) *methypsea* Butler, 1877— L.K.M (3, 4)
viii.9 ♂

(e) Vanessa Group

Precis Hübner [1819]

- P. iphita* (Cramer, 1779) *horsfieldi* (Moore, 1899)—ix.5 ♀, L.K.M (2, 3, 4)
xi.9 ♂
P. hedonia (Linnaeus, 1764) *ida* (Cramer, 1775)—xi.10 ♀ Johore. S
P. hedonia seitzi Corbet, 1937 T
P. atlites (Linnaeus, 1763) *atlites* (Linnaeus, 1763)— L.K.M (2, 3, 4). S
xi.11 ♂, 12 ♀
P. almana (Linnaeus, 1758) *javana* (C. Felder, 1862)— L.K.M (2, 3). S
xi.1 ♀, 2 ♀
(19) *P. lemonias* (Linnaeus, 1758) *lemonias* (Linnaeus, 1758) L.K. Penang
—xi.5 ♂. [syn. *aonis* (Linnaeus, 1758)]
P. orithya (Linnaeus, 1758) *wallacei* (Distant, 1883)— L.K.M (2, 3). S
xi.3 ♂, 4 ♀

Vanessa Fabricius, 1807

- V. cardui* (Linnaeus, 1758) *cardui* (Linnaeus, 1758) M (4, 5)

Polygonia Hübner [1819]

- P. canace* (Linnaeus, 1763) *perakana* (Distant, 1886) — M (4, 5)
xl.1 ♂

Symbrenthia Hübner [1819]

- S. hippoclus* (Cramer, 1779) *lucinus* Fruhstorfer, 1907— M (3, 4, 5)
xlii.4 ♂, 5 ♀
S. anna (Semper, 1888) *selangorana* Corbet, 1948 M (3)
S. hypselis (Godart, 1819) *sinis* Nicéville, 1891 M (3)
S. hypatia (Wallace, 1869) *chersonesia* Fruhstorfer, 1894— M (4)
xlii.6 ♂

Rhinopalpa C. & R. Felder, 1860

- R. polymys* (Cramer, 1779) *eudoxia* (Guérin-Ménéville, 1840)—xii.1 ♂, 2 ♀, xvii.6 ♀ (syn. *fulva* C. & R. Felder, 1860) M (3, 4). [S]

Yoma Doherty, 1886

- Y. sabina* (Cramer, 1780) *vasuki* Doherty, 1886 L

Hypolimnas Hübner [1819]

- H. antilope* (Cramer, 1777) *anomala* (Wallace, 1869)—
 f. *anomala* (Wallace, 1869)—xli.1 ♂, 3 ♀, 4 ♀.
 Upperside hindwing without a white band
 f. *nivas* Fruhstorfer, 1913—xli.2 ♂. Upperside
 hindwing with a whitish submarginal band
H. misippus (Linnaeus, 1764) *misippus* (Linnaeus, 1764)—
 xii.9 ♂, 11 ♂, xv.11 ♀
H. bolina (Linnaeus, 1758), *incommoda* Butler, 1877—
 xii.10 ♂, 12 ♂, xv.12 ♀, xvii.8 ♂, 9 ♀
H. bolina bolina (Linnaeus, 1758) [syn. *iphigenia* (Cramer,
 1775)] (syn. *iris* Wildey, 1941, *semiramis* Wildey,
 1941)

M (3). S
 L.K.M (2)
 K.M (2). S. Not
 found since early
 20th Century
 M (2). S. Since
 about 1934

Doleschallia C. Felder, 1861

- D. bisaltide* (Cramer, 1777) *siamensis* Fruhstorfer, 1912
D. bisaltide pratipa C. & R. Felder, 1860—ix.6 ♀, xi.8 ♂

L
 K.M (3, 4). [S]

Kallima Doubleday [1849]

- K. paralekia* (Horsfield, 1829) *amplirufa* Fruhstorfer, 1898
 —xxxvii.2 ♂

K.M (3). [S]

(f) *Cyrestis* Group*Cyrestis* Boisduval, 1832

- C. themire* Honrath, 1884, *themire* Honrath, 1884—
 xli.10 ♂ [syn. *periander* (Fabricius, 1787), praecoc.]
C. themire siamensis Fruhstorfer, 1898 (syn. *klossi* Pendle-
 bury, 1933)
C. themire robinsoni Pendlebury, 1933
C. cocles (Fabricius, 1787) *earli* Distant, 1883—
 f. *earli* Distant, 1883—xiii.5 ♂, xli.13 ♂. Ground
 colour yellowish white
 f. *formosa* C. & R. Felder, 1867—fig. 125 ♂. Ground
 colour white, with heavier markings
C. nivea (Zincken-Sommer, 1831) *nivalis* C. & R. Felder,
 1867—xii.3 ♂
C. maenalis Erichson, 1834, *martini* Hartert, 1902

L.K.M (3, 4)
 Perhentian Is.
 T
 L.K.M (3)
 K.M (3). T
 M (3, 4, 5)

Chersonesia Distant, 1883

- C. risa* (Doubleday [1849]) *cyaneae* (Nicéville, 1893)
C. rahria (Moore, 1857) *rahria* (Moore, 1857)—xii.4 ♀
C. rahria tsomana Pendlebury, 1933
C. intermedia Martin, 1895
C. peraka Distant, 1884 *peraka* Distant, 1884—xl.6 ♂

K.M (3, 4)
 K.M (3). S
 T
 M (3)
 M (3, 4). S

(g) *Limenitis* Group*Neptis* Fabricius, 1807 (= *Rahinda* Moore, 1881)

- N. hordonia* (Stoll, 1790) *hordonia* (Stoll, 1790)—xvii.13 ♂
N. peraka Butler, 1877, *peraka* Butler, 1877—xvii.2 ♀

L.K.M (3). S
 L.K.M (3). S

<i>N. dindiga</i> Butler, 1877, <i>dindiga</i> Butler, 1877—xvii.5 ♂	K.M (3). S
<i>N. aurelia</i> Staudinger, 1886	K.M (3). S
<i>N. hylas</i> (Linnaeus, 1758) <i>mamaja</i> Butler, 1877—xvi.14 ♂	L.K.M (2, 3, 4). S
<i>N. magadha</i> C. & R. Felder, 1867, <i>tharon</i> Butler, 1867—fig. 43 ♀	M (3). [S]
<i>N. duryodana</i> Moore, 1858, <i>nesia</i> Fruhstorfer, 1908—xvi.15 ♀	M (3)
<i>N. nata</i> Moore, 1857, <i>cresina</i> Fruhstorfer, 1908—xviii.1 ♀	M (3). S
<i>N. nandina</i> Moore, 1857, <i>leuconata</i> Butler, 1877—xvii.14 ♂	M (4)
<i>N. soma</i> Moore, 1858, <i>gononata</i> Butler, 1877—xviii.2 ♂	K.M (3, 4)
<i>N. yerburii</i> Butler, 1886, <i>pendleburyi</i> Corbet, 1937	M (4, 5)
<i>N. heliodore</i> (Fabricius, 1787) <i>heliodore</i> (Fabricius, 1787)	L.K
<i>N. heliodore dorelia</i> Butler, 1877—xvii.3 ♂, 4 ♀	M (2, 3). S
<i>N. vikasi</i> Horsfield, 1829, <i>omeroda</i> Moore, 1875—xvi.13 ♀, xliii.8 ♂	L.K.M (3, 4). [S]
<i>N. columella</i> (Cramer, 1780) <i>singa</i> (Fruhstorfer, 1899)—xvii.12 ♀	L.K.M (2, 3). S
<i>N. columella parvimaculo</i> Fendlebury, 1933	T
<i>N. sankara</i> (Kollar, 1844) <i>quitta</i> Swinhoe, 1897	M (4, 5)
<i>N. anjana</i> Moore, 1881, <i>hyria</i> Fruhstorfer, 1913—xxxvi.11 ♂	M (4, 5)
<i>N. miah</i> Moore, 1857, <i>sarchoa</i> (Fruhstorfer, 1908)—xli.14 ♂	M (3, 4). S
<i>N. ebusa</i> C. & R. Felder, 1863, <i>fuliginosa</i> Moore, 1881	L.M (3)
<i>Parathyma</i> Moore, 1898 (= <i>Pantoporia</i> Auctorum)	
<i>P. pravara</i> (Moore, 1857) <i>helma</i> (Fruhstorfer, 1906)—xvi.11 ♀	K.M (3, 4)
<i>P. perius</i> (Linnaeus, 1758) <i>perius</i> (Linnaeus, 1758)—xvi.2 ♂	L.K.M (2, 3). S
<i>P. asura</i> (Moore, 1857) <i>idita</i> (Moore, 1858)—xvi.9 ♂, 10 ♀	M (3). S
<i>P. larymna</i> (Doubleday [1848]) <i>siamensis</i> (Fruhstorfer, 1906)—xvi.1 ♂	M (3)
<i>P. kanwa</i> (Moore, 1858) <i>kanwa</i> (Moore, 1858)	L.M (3). S
<i>P. reta</i> (Moore, 1858) <i>moorei</i> (Fruhstorfer, 1906)—xvi.3 ♂	M (3). S
<i>P. ranga</i> (Moore, 1857) <i>malaya</i> (Pendlebury, 1933)	M (4, 5)
<i>P. abiasa</i> (Moore, 1858) <i>clerica</i> (Butler, 1877)—xvi.8 ♀	M (3, 4)
<i>P. selenophora</i> (Kollar, 1844) <i>amharina</i> (Moore, 1898)—xvi.5 ♀	M (3, 4)
<i>P. cama</i> (Moore, 1857) <i>gynea</i> (Swinhoe, 1899) (syn. <i>cardoni</i> Corbet, 1937)	M (4)
<i>P. nefte</i> (Cramer, 1779) <i>subrata</i> (Moore, 1858)—xvi.6 ♂ [syn. <i>urvasi</i> (C. & R. Felder, 1860)—xvi.12 ♂, <i>minifera</i> (Butler, 1877)]	K.M (3, 4). S
♀-f. <i>subrata</i> (Moore, 1858)—xvi.4 ♀. Upperside chocolate brown	
♀-f. <i>neftina</i> (Fruhstorfer, 1906)—xvi.7 ♀. Upperside orange brown	
<i>Limnitis</i> Fabricius, 1807	
<i>L. daraxa</i> Doubleday, 1848, <i>theoda</i> Fruhstorfer, 1903	M (4, 5)
<i>L. agneya</i> Doherty, 1891	M (4)

	<i>Moduza</i> Moore, 1881	
	<i>M. procris</i> (Cramer, 1777) <i>procris</i> (Cramer, 1777)	L.K
	<i>M. procris milonia</i> (Fruhstorfer, 1906)—xvii.1 ♂	K.M (2, 3). S
	<i>Pandita</i> Moore, 1857	
	<i>P. sinope</i> Moore, 1857, <i>sinope</i> Moore, 1857—xii.13 ♀	M (3, 4). S
	(h) <i>Parthenos</i> Group	
	<i>Lebadea</i> C. Felder, 1861	
	<i>L. martha</i> (Fabricius, 1787) <i>martha</i> (Fabricius, 1787)	L
	<i>L. martha koenigi</i> Corbet, 1941	K
	<i>L. martha malayana</i> Fruhstorfer, 1902—xvii 10 ♂, 11 ♀	M (3). S
	<i>Parthenos</i> Hübner [1819]	
	<i>P. sylvia</i> (Cramer, 1775) <i>lilacinus</i> Butler, 1877—xi.7 ♀	L.K.M (2, 3). S
	(i) <i>Euthalia</i> Group	
	<i>Tanaecia</i> Butler, 1869	
	<i>T. pelea</i> (Fabricius, 1787) <i>pelea</i> (Fabricius, 1787)— xiv.13 ♀, xv.8 ♂, xviii.9 ♀, xix.6 ♂ [syn. <i>pulasara</i> (Moore, 1857), <i>supercilia</i> Butler, 1869, <i>ampla</i> Butler, 1901, <i>producta</i> Butler, 1901]	M (3, 4). S
	<i>T. pelea irenae</i> Corbet, 1937	T
	<i>T. palguna</i> (Moore, 1857) <i>consanguinea</i> Distant, 1886— xliii.4 ♂	M (3)
(21)	<i>T. coelebs</i> Corbet, 1941	M (3)
	<i>T. clathrata</i> (Vollenhoeven, 1862) <i>violaria</i> Butler, 1869— xv.9 ♀ [syn. <i>nicévillei</i> Distant, 1884—xl.9 ♀ <i>subclathrata</i> (Staudinger, 1897)]	K.M (3). [S]
	<i>T. munda</i> Fruhstorfer, 1899, <i>waterstradti</i> Corbet, 1941	M (3)
	<i>T. aruna</i> (C. & R. Felder, 1860) <i>aruna</i> (C. & R. Felder, 1860)—xv.7 ♂ (syn. <i>robertsii</i> Butler, 1874, <i>satapana</i> Fruhstorfer, 1913)	L.M (3)
	<i>T. julii</i> (Lesson, 1837) <i>bougainvillei</i> Corbet, 1941— xxxvi.10 ♂, 9 ♀	L.K.M (4)
	<i>Euthalia</i> Hübner [1819]	
(22)	<i>E. lepidea</i> (Butler, 1868) <i>flora</i> (M. R. Butler, 1873)— xviii.6 ♀ (syn. <i>macnairi</i> Distant, 1883—xiv.6 ♂, 10 ♀, <i>stoliczkan</i> Distant, 1883—xiv.11 ♀, <i>macleyi</i> Distant, 1883—xiv. 12 ♀, <i>penerka</i> Talbot & Corbet, 1943)	L.K
	<i>E. lepidea matala</i> (Fruhstorfer, 1905)—xxxvi.4 ♂, 5 ♀	M (4)
	<i>E. cocytus</i> (Fabricius, 1787) <i>cocytus</i> (Fabricius, 1787)	L
	<i>E. godartii</i> (G. R. Gray, 1846) <i>asoka</i> (C. & R. Felder, 1867)—xv.5 ♂	L M (3, 4)
	♀-f. <i>asoka</i> (C. & R. Felder, 1867)—xiv.3 ♀. Fore- wing submarginal areas pale greyish blue	
	♀-f. <i>jordani</i> (Fruhstorfer, 1896). Forewing sub- marginal areas greyish white	

- (23) *E. iapis* (Godart, 1819) *puseda* (Moore, 1857)—xv.3 ♀, xviii.8 ♀ [syn. *cocyla* (Fabricius, 1793), *praeocc.*] K.M (3, 4). S
E. monina (Fabricius, 1787) *monina* (Fabricius, 1787)—xviii.9 ♀, fig. 40 ♀, fig. 41 ♀ [syn. *somadeva* (C. & R. Felder, 1867), *laverna* (Butler, 1870)] L.K.M (3, 4). S
♂-f. *monina* (Fabricius, 1787)—[syn. *lamada* (Moore, 1859), *perakana* (Fruhstorfer, 1899)—xix.5 ♂]. Hindwing border blue
♂-f. *decoratus* (Butler, 1869)—xiv.9 ♂ Hindwing border greenish
♂-f. *gardineri* (Fruhstorfer, 1906)—xliii.3 ♂, xiv.7 ♂. Upperside dark brown
E. aconthea (Cramer, 1777) *garuda* (Moore, 1857) L
E. aconthea gorda Fruhstorfer, 1906—xiv.1 ♂, 2 ♀ M (2, 3). S
E. alpheda (Godart, 1819) *keda* Pendlebury, 1939 L.K
E. alpheda yamuna Fruhstorfer, 1906—xiv.8 ♂, xv.4 ♀ M (3)
E. merta (Moore, 1859) *milleri* Pendlebury, 1939 L
E. merta merta (Moore, 1359)—xxxvii.7 ♂, xliii.2 ♀ M (3) S
E. mahadeva (Moore, 1859) *zichrina* Fruhstorfer, 1904—xliii.6 ♂ K.M (3)
E. kanda (Moore, 1859) *marana* Corbet, 1937 I.M (3)
(24) *E. phemius* (Doubleday, 1848) *corbeti* Pendlebury, 1939 L
E. phemius ipona Fruhstorfer, 1913 M (3)
E. agnis (Vollenhoeven, 1862) *paupera* Fruhstorfer, 1906—xliii.1 ♂ M (4)
E. anosta (Moore, 1857) *bunaya* Fruhstorfer, 1913—xiv.5 ♀ M (3)
E. djata Distant & Pryer, 1887, *siamica* Riley & Godfrey, 1925 L
E. lubentina (Cramer, 1777) *malaccana* Fruhstorfer, 1899—xix.10 ♂ (syn. *chersonesia* Fruhstorfer, 1904) L.M (2, 3, 4)
E. adonia (Cramer, 1779) *pinwilli* Pendlebury & Corbet, 1938—xix.11 ♀ M (3, 4). S
E. whiteheadi Grose-Smith, 1889, *zinara* Pendlebury & Corbet, 1938 M (4)
E. leuta (Doubleday [1848]) *goodrichi* Distant, 1886—xliii.12 ♀, xxxvii.4 ♂ L.K.M (3)
E. recta (Nicéville, 1886) *monilis* (Moore, 1897) L, North Perak
E. evelina (Stoll, 1790) *compta* Fruhstorfer, 1899—xix.4 ♂ L.K.M (3). S
E. dunya (Doubleday [1848]) *dunya* (Doubleday [1848])—xxxviii.1 ♀ L.K.M (3)
E. dirtea (Fabricius, 1793) *dirteana* Corbet, 1941—xii.7 ♂, 8 ♀ L.K.M (3, 4). S
E. canescens (Butler, 1869) *pardalina* (Staudinger, 1886)—xl.7 ♀ K.M (3). S

(j) *Apatura* Group
Amnosia Doubleday [1849]
*(25) *A. decora* Doubleday [1849] *perakana* Fruhstorfer, 1908 M (4)

Stibochiona Butler, 1868
S. nicea (G. R. Gray, 1846) *subucula* Fruhstorfer, 1898 M (3, 4)

<i>Dichorragia</i> Butler, 1868	
<i>D. nesimachus</i> (Boisduval, 1836) <i>deiokes</i> Fruhstorfer, 1913	M (3, 4)
<i>Apatura</i> Fabricius, 1807	
<i>A. parisatis</i> Westwood [1850] <i>siamensis</i> Fruhstorfer, 1913	M (3)
<i>Sephisa</i> Moore, 1882	
<i>S. chandra</i> (Moore, 1857) <i>stubbisi</i> Corbet, 1941	M (4, 5)
<i>Eulaceura</i> Butler, 1872	
<i>E. osteria</i> (Westwood [1850]) <i>kumana</i> Fruhstorfer, 1913— xii.5 ♂, 6 ♀	M (3). S
<i>Hestina</i> Westwood [1850]	
<i>H. nama</i> (Doubleday, 1845) <i>ruvanella</i> Fruhstorfer, 1913— xliii.9 ♂	M (3, 4, 5)
<i>Herona</i> Doubleday [1848]	
<i>H. marathus</i> Doubleday [1848] <i>angustata</i> Moore, 1879	L
<i>H. sumatrana</i> Moore, 1881, <i>dusuntua</i> Corbet, 1937	M (3)
<i>Idrusia</i> Corbet, 1943 (= <i>Euripus</i> Doubleday [1848], praecocc.)	
<i>I. nyctelius</i> (Doubleday, 1845) <i>euploeoides</i> (C. & R. Felder, 1867)—xiii.6 ♂	L.M (3). S
♀-f. <i>euploeoides</i> (C. & R. Felder, 1867)—xiii.7 ♀.	
Resembles <i>Euploea diocletianus</i> ♀	
♀-f. <i>isina</i> Corbet, 1947—xliii.11 ♀. Resembles <i>Euploea diocletianus</i> ♂	
(k) Charaxcs Group	
<i>Prothoe</i> Hübner [1824]	
<i>P. francki</i> (Godart, 1819) <i>uniformis</i> Butler, 1885— xxxviii.4 ♂	K.M (3). S
<i>P. calydonia</i> (Hewitson, 1854) <i>calydonia</i> (Hewitson, 1854) —xiii.9 ♂	K.M (3)
<i>Polyura</i> Billberg, 1820 (= <i>Murwareda</i> Moore, 1896, <i>Eriboea</i> Auctorum)	
<i>P. athamas</i> (Drury, 1773) <i>samatha</i> (Moore, 1879)—xiii.8 ♂	L.K.M (3, 4). [S]
<i>P. moori</i> (Distant, 1883) <i>moori</i> (Distant, 1883)—xiii.3 ♂	M (3). [S]
<i>P. hebe</i> (Butler, 1866) <i>chersonesus</i> (Fruhstorfer, 1898)— xv.2 ♂	M (3)
<i>P. hebe plautus</i> (Fruhstorfer, 1898)	S
<i>P. jalysus</i> (C. & R. Felder, 1867) <i>jalysus</i> (C. & R. Felder, 1867)—xiii.4 ♂	M (3)
<i>P. eudamippus</i> (Doubleday, 1843) <i>peninsularis</i> (Fendlebury, 1933)	M (3, 4, 5)

- P. delphis* (Doubleday, 1843) *concha* (Vollenhoeven, 1861) K.M (3)
—xv.1 ♂
- P. schreiberi* (Godart, 1819) *tisamenus* (Fruhstorfer, 1914) M (3). S
—xiii.2 ♂
- Charaxes* Ochsenheimer, 1816
- C. solon* (Fabricius, 1793) *echo* (Butler, 1867)—fig. 38 ♂ M (3). [S]
C. polyxena (Cramer, 1775) *crepax* Fruhstorfer, 1914— K.M (3). S
xiii.1 ♂, xxxvi.1 ♂ (syn. *parafervens* Fruhstorfer,
1914)
- *(26) *C. marmax* Westwood, 1847, *philosarcus* Fruhstorfer, 1914 M (3)
C. harmodius C. & R. Felder, 1867, *martinus* Rothschild, M (3)
1900
- C. distanti* Honrath, 1885, *distanti* Honrath, 1885— M (3, 4)
xxxvi.2 ♂
- C. bornnensis* Butler, 1869, *praestantius* Fruhstorfer, 1914— K.M (3, 4)
xxxvii.6 ♂
- C. durnfordi* Distant, 1884, *durnfordi* Distant, 1884— xl.8 ♂ M (3)

Family LIBYTHEIDAE

Libythea Fabricius, 1807

- *(27) *L. narina* Godart, 1819, *rohini* Marshall, 1891 M
L. myrrha Godart, 1819, *hecura* Fruhstorfer, 1914— xlii.2 ♂ M (3)

Family RIODINIDAE

Zemeros Boisduval [1836]

- Z. flegyas* (Cramer, 1780) *allica* (Fabricius, 1787) L
Z. flegyas albipunctata Butler, 1874— xviii.12 ♂ M (3, 4). S
Z. emesoides C. & R. Felder, 1860, *emesoide*. C. & R. K.M (3). [S]
Felder, 1860— xviii.3 ♂, 4 ♀

Dodona Hewitson [1866]

- D. eugenes* Bates, 1867, *chaseni* Corbet, 1941 M (5)
D. egeon (Westwood, 1851) *confluens* Corbet, 1941 M (4)
D. deodata Hewitson, 1876, *anu* Corbet, 1937 M (4)

Abisara C. & R. Felder, 1860

- A. kausambi* C. & R. Felder, 1860, *kausambi* C. & R. M (3)
Felder, 1860
- A. geza* Fruhstorfer, 1904, *niya* Fruhstorfer, 1914 M (3). S
A. saturata (Moore, 1878) *kausambioides* Nicéville, 1896— K.L.M (3, 4). S
xviii.10 ♂, 11 ♀
- A. neophron* (Hewitson, 1861) *chelina* (Fruhstorfer, 1904)— M (4)
xxxvi.6 ♂
- A. savitri* C. & R. Felder, 1860, *savitri* C. & R. Felder, M (3). S
1860— xviii.5 ♀

Laxita Butler, 1879

- L. damajanti* (C. & R. Felder, 1860) *damajanti* (C. & R. K.M (3, 4)
Felder, 1860)— xviii.14 ♂, xl.10 ♂, 11 ♀

L. telesia (Hewitson, 1851) *lycene* Nicéville, 1894—
xl.2 ♂, 3 ♀ K.M (3, 4)

L. orphna (Boisduval, 1836) *laocoon* Nicéville, 1894 (syn.
lyncestis Nicéville 1894) K.M (3, 4)

Taxila Doubleday, 1847

T. thuisto Hewitson, 1861, *thuisto* Hewitson, 1861—fig.
51 ♂, 52 ♀ L.K.M (3). S

T. ha ruinus (Fabricius, 1793) *haquinus* (Fabricius, 1793)—
xviii.13 ♀ K.M (3, 4). S

Stiboges Butler, 1876

S. nymphidia Butler, 1876, *nymphidia* Butler, 1876—
xxiv.11 ♀ K.M (3, 4)

Family LYCAENIDAE

Subfamily PORITIINAE

Cyaniriodes Nicéville, 1890

C. libna (Hewitson, 1869) *andersonii* (Moore, 1884) L.M (3)

(28) *Poritia* Moore, 1866

P. sumatrae (C. & R. Felder, 1865) *sumatrae* (C. & R.
Felder, 1865)—xx.12 ♀, xxii.2 ♂, 3 ♀ M (3). S

P. philota Hewitson, 1874, *philota* Hewitson, 1874 M (3). S

P. erycinoides (C. & R. Felder, 1865) *phraatica* Hewitson,
1878—xxiv.8 ♀ L.M (3). [S]. T

P. pleurala Hewitson, 1874, *pleurala* Hewitson, 1874—
xxii.6 ♂, 5 ♀ (syn. *talava* Corbet, 1940)—xxii.5 ♀
A.T. K.L.M (3). [S]

P. promula Hewitson, 1874, *elegans* Fruhstorfer, 1919—
xxi. 21 ♂ M (4)

Simiskina Distant, 1886

S. phalena (Hewitson, 1874) *phalena* (Hewitson, 1874)—
xxii.8 ♂ (syn. *solyma* Nicéville, 1894) M (3, 4). [S]

S. pheretia (Hewitson, 1874) *pheretia* (Hewitson, 1874)—
xxii.9 ♂, 10 ♀ M (3). [S]

S. pharyge (Hewitson, 1874) *deolina* (Fruhstorfer, 1917)—
xli.8 ♂ L.M (3, 4)

S. pasira (Moulton, 1911) K.M (3)

S. dohertyi Evans, 1925, *dohertyi* Evans, 1925 M (4, 5)

S. phalia (Hewitson, 1874) *potina* (Hewitson, 1874)—
xxii.7 ♀ (syn. *fulgens* Distant, 1886—xlii.3 ♀) M (3). [S]

S. pediada (Hewitson, 1877) *pediada* (Hewitson, 1877)—
xxii.16 ♀ L.M (3). [S]

S. philura (H. H. Druce, 1895) *eliasi* Corbet, 1940 M (3)

Deramas Distant, 1886

D. livens Distant, 1886, *livens* Distant, 1886—xlii.15 ♂ L.K.M (3, 4). [S]
[syn. *bradamante* (Nicéville, 1890), *pharygoides*
(Nicéville, 1890)]

Subfamily MILETINAE

Miletus Hübner [1819] (= *Gerydus* Boisduval, 1836)

<i>M. gaesa</i> (Nicéville, 1895) <i>gaesa</i> (Nicéville, 1895)	L.M (3). S
<i>M. archilochus</i> (Fruhstorfer, 1913) <i>kelantanus</i> Corbet, 1938	L.Kelantan, Penang
<i>M. boisduvali</i> Moore, 1857, <i>xeragis</i> (Fruhstorfer, 1916)	L.M (3). S
<i>M. biggsii</i> (Distant, 1884) <i>biggsii</i> (Distant, 1884)— xxii.12 ♀ (syn. <i>gopara</i> (Nicéville, 1890), <i>fictus</i> Corbet, 1939)	M (3, 4). ST
<i>M. zinckenii</i> (C. & R. Felder, 1865) <i>pallaxopas</i> (Fruhstorfer, 1913)	M (3)
<i>M. symethus</i> (Cramer, 1777) <i>diopethes</i> (Fruhstorfer, 1913) xx.2 ♂, xxii.14 ♀	L.M (3). S
<i>M. ancon</i> (Doherty, 1889) <i>gigantes</i> (Nicéville, 1894)	M (3, 4)
<i>M. gallus</i> (Nicéville, 1894) <i>gallus</i> (Nicéville, 1894)	M (3)
<i>M. heracleion</i> (Doherty 1891)	M (3)

Allotinus C. & R. Felder, 1865

<i>A. subviolaceus</i> C. & R. Felder, 1865, <i>alkamah</i> Distant, 1886—xliv.3 ♀	L.M (3). S
<i>A. nivalis</i> (H. Druce, 1873) <i>substrigosa</i> (Moore, 1884)— xxii.11 ♀	M (3, 4). S
<i>A. unicolor</i> C. & R. Felder, 1865, <i>dilutus</i> Corbet, 1939	L.K.M (3, 5)
<i>A. unicolor unicolor</i> C. & R. Felder, 1865	S
<i>A. apries</i> Fruhstorfer, 1913, <i>eupalion</i> Fruhstorfer, 1914	M (3)
<i>A. horsfieldi</i> (Moore, 1857) <i>vadosus</i> Corbet, 1939—xx.7 ♂ (syn. <i>nessus</i> Corbet, 1939, <i>lindus</i> Corbet, 1939)	L.M (3). S.T
<i>A. fabius</i> (Distant & Pryer, 1887) <i>arrius</i> Fruhstorfer, 1914	M (3)
<i>A. taras</i> (Doherty, 1889) <i>taras</i> (Doherty, 1889)	L.K.M (3)
<i>A. panormis</i> Elwes, 1893, <i>fruhstorferi</i> Corbet, 1939	M (4)
<i>A. strigatus</i> Moulton, 1911, <i>malayanus</i> Corbet, 1939	L.M (3). S.T
<i>A. borneensis</i> Moulton, 1911, <i>elioti</i> Corbet, 1939	M (3, 4)

Logania Distant, 1884

<i>L. malayica</i> Distant, 1884, <i>malayica</i> Distant, 1884— xxii.21 ♀	M (3)
<i>L. regina</i> (H. Druce, 1873) <i>sriwa</i> Distant, 1886—xliv.16 ♀	M (3)
<i>L. marmorata</i> Moore, 1884, <i>damis</i> Fruhstorfer, 1914	L.M (3). S
<i>L. massalia</i> Doherty, 1891, <i>luca</i> Nicéville, 1894	M (3)

Subfamily LYCAENINAE

Spalgis Moore, 1879

<i>S. epus</i> (Westwood, 1851) <i>nubilus</i> Moore, 1884	L.M (3). S
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Taraka Doherty, 1889

<i>T. hamada</i> (H. Druce, 1875) <i>mendesia</i> Fruhstorfer, 1918	M (3, 4)
<i>T. mahaneira</i> Doherty (in Nicéville), 1890, <i>mahaneira</i> Doherty (in Nicéville), 1890 (syn. <i>hantu</i> Corbet, 1938)	M (3)

<i>Castalius</i> Hübner [1819]		
	<i>C. rosimon</i> (Fabricius, 1775) <i>rosimon</i> (Fabricius, 1775)— xxii.20 ♀	L.K.M (3)
	<i>C. ethion</i> Westwood, 1851, <i>thalimar</i> Fruhstorfer, 1922— xxii.25 ♂	L.K.M (3)
	<i>C. roxus</i> (Godart, 1819) <i>pothus</i> Fruhstorfer, 1918— xxii.24 ♂	L.K.M (3)
	<i>C. elna</i> (Hewitson, 1876) <i>elvira</i> Fruhstorfer, 1918—xx.4 ♂	L.K.M (3). S
	<i>C. elna epeus</i> Corbet, 1938	T
<i>Tarucus</i> Moore, 1881		
(29)	<i>T. waterstradi</i> H. H. Druce, 1895, <i>vileja</i> Fruhstorfer 1918	M (3)
<i>Niphanda</i> Moore, 1875		
	<i>N. cymbia</i> Nicéville, 1883, <i>cymbia</i> Nicéville, 1883	M (3)
	<i>N. tessellata</i> Moore, 1875, <i>tessellata</i> Moore, 1875— xliv.21 ♀ [syn. <i>aethiops</i> (Distant, 1886)—xlii.13 ♂]	M (3)
(30)	<i>N. asialis</i> (Nicéville, 1895)	M (2)
<i>Pithecopis</i> Horsfield, 1828		
	<i>P. corvus</i> Fruhstorfer, 1919, <i>corvus</i> Fruhstorfer, 1919	L.K.M (3, 4)
<i>Neopithecopis</i> Distant, 1884		
	<i>N. zalmora</i> (Butler, 1870) <i>horsfieldi</i> Distant, 1884— xxii.15 ♂	L.K.M (3). S
<i>Everes</i> Hübner [1819]		
(31)	<i>E. lacturnus</i> (Godart, 1819) <i>rileyi</i> Godfrey, 1916—fig. 66 ♂	K.M (2, 3). S
	<i>E. potanini</i> (Alpheraky, 1889) <i>glycon</i> Corbet, 1940	L. Perak
<i>Megisba</i> Moore, 1881		
	<i>M. malaya</i> (Horsfield, 1828) <i>velina</i> Fruhstorfer, 1918— xliv.4 ♂	L.K.M (3)
<i>Lycænopsis</i> C. & R. Felder, 1865		
	<i>L. haraldus</i> (Fabricius, 1787) <i>haraldus</i> (Fabricius, 1787)— xxi.6 ♂ (syn. <i>ananga</i> C. & R. Felder, 1865)	L.M (3, 4). [S]
<i>Celastrina</i> Tutt, 1906		
	<i>C. melaena</i> Doherty, 1889, <i>cowani</i> Corbet, 1940	M (3, 4)
	<i>C. pellecebra</i> (Fruhstorfer, 1910) <i>pellecebra</i> (Fruhstorfer, 1910)	M (3, 4)
	<i>C. cyma</i> Toxopeus, 1927—xliv.6 ♂	L.M (3, 4)
	<i>C. puspa</i> (Horsfield, 1828) <i>lambi</i> (Distant, 1882)—xxi.22 ♂	K.M (3, 4). S
	<i>C. puspa volumna</i> (Fruhstorfer, 1922)	T
	<i>C. cossaea</i> (Nicéville, 1896) <i>distanti</i> (Fruhstorfer, 1910)— xliv.10 ♂	M (3, 4)
	<i>C. carna</i> (Nicéville, 1895) <i>splendens</i> (Butler, 1900)	M (4, 5)

(32)	<i>C. corythus</i> (Nicéville, 1895) <i>toxopeusi</i> Corbet, 1937	M (4)
	<i>C. coalita</i> (Nicéville, 1891) <i>margarelon</i> (Fruhstorfer, 1922)	M (4, 5)
	<i>C. akasa</i> (Horsfield, 1828) <i>catullus</i> (Fruhstorfer, 1910)	M (4, 5)
	<i>C. aristinus</i> (Fruhstorfer, 1917) <i>Mossi</i> Corbet, 1937	T
	<i>C. alboceruleus</i> (Moore, 1897) <i>scharffi</i> Corbet, 1937	M (4)
	<i>C. ceyx</i> (Nicéville, 1892) <i>tanarata</i> Corbet, 1937 (syn. <i>parvula</i> Corbet, 1938)	M (4)
	<i>C. camenae</i> (Nicéville, 1895) <i>pendleburyi</i> Corbet, 1937	M (4, 5)
	<i>C. singalensis</i> (R. Felder, 1868) <i>xanthippe</i> Corbet, 1937	M (4, 5)
	<i>C. dilectus</i> (Moore, 1879) <i>briga</i> (Fruhstorfer, 1917)	M (3, 4, 5)
	<i>C. limbata</i> (Moore, 1879) <i>isabella</i> Corbet, 1937 — xliv.7 ♂	M (4)
	<i>C. placidula</i> (H. H. Druce, 1895) <i>irenae</i> Corbet, 1937	M (4, 5)
	<i>C. musina</i> (Snellen, 1892) <i>candaules</i> (Nicéville, 1895)	M (4, 5)
	<i>C. quadriplaga</i> (Snellen, 1892) <i>archena</i> Corbet, 1940	M (4)
<i>Chilades</i> Moore, 1881		
	<i>C. lajus</i> (Stoll, 1780) <i>lavoyana</i> Evans, 1925	L.K
<i>Zizina</i> Chapman, 1910		
	<i>Z. otis</i> (Fabricius, 1787) <i>lampa</i> (Corbet, 1940)—xx.9 ♂	L.K.M (2, 3). S
<i>Zizeeria</i> Chapman, 1910		
(33)	<i>Z. knysna</i> (Trimen, 1862) <i>karsandra</i> (Moore, 1865) —xxii.22 ♀	K.Penang. S
<i>Zizula</i> Chapman, 1910		
(34)	<i>Z. hylax</i> (Fabricius, 1775) <i>pygmaea</i> (Snellen, 1876)—fig. 126 ♂	L.K.M (2, 3). S
<i>Euchrysops</i> Butler, 1900		
	<i>E. cnejus</i> (Fabricius, 1798) <i>cnejus</i> (Fabricius, 1798)— xxi.2 ♂, xlv.15 ♀	K.L.M (2, 3). S
	<i>E. pandava</i> (Horsfield, 1829) <i>pandava</i> (Horsfield, 1829)— xxi.17 ♂	L.M (3). S
<i>Anthene</i> Doubleday, 1847 (= <i>Lycaenesthus</i> Moore, 1865)		
	<i>A. emolus</i> (Godart, 1819) <i>gobertus</i> (Fruhstorfer, 1916)— xliv.9 ♂ [syn. <i>klanga</i> (Corbet, 1938)]	L.K.M (3, 4). S.T
	<i>A. lycamoides</i> (C. Felder, 1860) <i>miya</i> (Fruhstorfer, 1916)— xxi.3 ♂	K.M (3). S
	<i>A. licates</i> (Hewitson, 1874) <i>dusuntua</i> Corbet, 1940	L.M (3)
<i>Catochrysops</i> Boisduval, 1832		
	<i>C. strabo</i> (Fabricius, 1793) <i>strabo</i> (Fabricius, 1793)— xxi.8 ♂, 14 ♀ (syn. <i>riama</i> Corbet, 1938)	M (2, 3). S
	<i>C. panormus</i> (C. Felder, 1860) <i>exiguus</i> (Distant, 1886)— xliv.17 ♂ (syn. <i>perakana</i> Corbet, 1938)	K.M (2, 3.) [S]

	<i>Lampides</i> Hübner [1819] (= <i>Cosmolyce</i> Toxopeus, 1927)	
	<i>L. boeticus</i> (Linnaeus, 1767)—xx.8 ♂, 1 ♀ (syn. <i>bagus</i> (Distant, 1886)—xliv.13 ♀)	L.K.M (2, 3, 4). S
	<i>Jamides</i> Hübner [1819] (= <i>Lampides</i> Auctorum)	
	<i>J. bochus</i> (Stoll, 1782) <i>nabonassar</i> (Fruhstorfer, 1915)—xxi.19 ♂, 16 ♀	L.K.M (2, 3, 4). S
	<i>J. celeno</i> (Cramer, 1775) <i>aelianus</i> (Fabricius, 1793)—xxi.18 ♂, fig. 127 ♀	L.M (2, 3, 4). S
	<i>J. pura</i> (Moore, 1886) <i>pura</i> (Moore, 1886)—xxii.19 ♂	M (3, 4). S
	<i>J. zebra</i> (H. H. Druce, 1895) <i>lakatti</i> Corbet, 1940	M (3)
	<i>J. malaccanus</i> (Röber, 1886) <i>malaccanus</i> (Röber, 1886)	L.K.M (3)
	<i>J. parasaturatus</i> (Fruhstorfer, 1915) <i>paramalaccanus</i> Riley & Corbet, 1938	K.M (3, 4)
	<i>J. talinga</i> (Kheil, 1884)	L.M (3)
	<i>J. caeruleus</i> (H. Druce, 1873) <i>caeruleus</i> (H. Druce, 1873)—xx.18 ♂, 11 ♀	M (2, 3, 4). S
	<i>J. elpis</i> (Godart, 1819) <i>pseudelpis</i> (Butler, 1877)—xx.27 ♂, 28 ♀ (poor)	L.M (3, 4). S
	<i>J. alecto</i> (C. Felder, 1860) <i>ageladas</i> (Fruhstorfer, 1915)—xxi.25 ♂, 26 ♀	K.M (3, 4). S
	<i>J. ferrari</i> Evans, 1932, <i>evansi</i> Riley & Corbet, 1938	M (3, 4)
	<i>J. cunilda</i> (Snellen, 1896) <i>nisanca</i> (Fruhstorfer, 1915)—xxi.24 ♂	L.K.M (3)
	<i>J. abdul</i> (Distant, 1886) <i>abdul</i> (Distant, 1886)—xliv.22 ♀ [syn. <i>marakata</i> (Nicéville, 1890)]	M (3). S
	<i>J. philatus</i> (Snellen, 1878) <i>subditus</i> (Moore, 1886)	L.K.M (3)
(35)	<i>J. aratus</i> (Stoll, 1781) <i>adana</i> (H. Druce, 1873)	T
	<i>J. cyta</i> (Boisduval, 1832) <i>minna</i> Riley & Corbet, 1938	M (4)
	<i>Una</i> Nicéville, 1890	
	<i>U. usta</i> (Distant, 1886) <i>usta</i> (Distant, 1886)—xliv.5 ♂	M (3, 4). S
	<i>Nacaduba</i> Moore, 1881 (= <i>Ionolyce</i> Toxopeus, 1929)	
	<i>N. angusta</i> (H. Druce, 1873) <i>kerriana</i> Distant, 1884—xlii.12 ♂	L.K.M (3). S
	<i>N. pactolus</i> (C. Felder, 1860) <i>odon</i> Fruhstorfer, 1916—xx.3 ♂	M (3, 4). S.T
	<i>N. asaga</i> Fruhstorfer, 1916, <i>pendleburyi</i> Corbet, 1938	M (3, 4). S
(36)	<i>N. hermus</i> (C. Felder, 1860) <i>swatipa</i> Corbet, 1938	L.M (3, 4). S
(36)	<i>N. subperusia</i> (Snellen, 1806) <i>lysa</i> Fruhstorfer, 1916 (syn. <i>intricata</i> Corbet, 1938)—xxi.7 ♀	L.M (3, 4). S
	<i>N. sanaya</i> Fruhstorfer, 1916, <i>elioti</i> Corbet, 1938—xliv.8 ♀	L.M. (3, 4). S
	<i>N. pavana</i> Horsfield, 1828, <i>singapura</i> Corbet, 1938	S (mangrove)
	<i>N. kurava</i> Moore, 1857, <i>nemana</i> Fruhstorfer, 1916	L.M (3, 4). S
(36)	<i>N. beroë</i> (C. & R. Felder, 1865) <i>neon</i> Fruhstorfer, 1916	L.M (3, 4). S
	<i>N. berenice</i> (Herrich-Schäffer, 1869) <i>icena</i> Fruhstorfer, 1916—xx.16 ♀, 17 ♂, 22 ♂ (fig. poor, tails missing)	L.M (3). S
	<i>N. calauria</i> (C. Felder, 1860) <i>malayica</i> Corbet, 1938	M (3, 4). S
	<i>N. helicon</i> (C. Felder, 1860) <i>merguiana</i> Moore, 1884—xx.24 ♂, fig. 65 ♂	K.M (2, 3, 4). S.T
	<i>N. aluta</i> (H. Druce, 1873) <i>nanda</i> Nicéville, 1896	K.M (3)
	<i>N. nelides</i> Nicéville, 1895	M (4)

- N. bhutea* Nicéville, 1884 M (3, 4)
N. gracilis (Röber, 1886) *ni* Nicéville, 1902 K.M (3)
N. nora (C. Felder, 1860) *superdates* Fruhstorfer, 1916— K.M (2, 3, 4). S
 xx.14 ♂, 13 ♀
N. dubiosa (Semper, 1878) *lumpura* Corbet, 1938 M (2, 3). S
N. lutea Martin, 1895, *sivoka* Evans, 1910 K.M (3)

Calophrys Toxopeus, 1929

- C. ancyra* (C. Felder, 1860) *aberrans* (Elwes, 1893) M (3)

Petrelaea Toxopeus, 1929

- P. dana* (Nicéville, 1884) *dana* (Nicéville, 1884) K.M (3)

Heliophorus Geyer, 1832 (= *Ilerda* Doubleday, 1847)

- H. epicles* (Godart, 1819) *indicus* (Fruhstorfer, 1908) M (4)
H. ila (Nicéville, 1896) *malaya* Pendlebury, 1936 M (4, 5)

Hypochrysops C. & R. Felder, 1860

- (37) *H. coelisparvus* (Butler, 1883) *kerri* Riley, 1932 M (3)

Subfamily THECLINAE

Thecla Fabricius, 1807

- (38) *T. absolon* (Hewitson, 1865) *malayica* Pendlebury, 1939 M (5)

Curetis Hübner [1819]

- C. felderi* Distant, 1884—xxiv.3 ♂ (syn. *gabrielii* Corbet, 1937) M (3)
C. bulis (Westwood, [1851]) *bulis* (Westwood [1851])— L.K.M (3, 4). S.T
 xlv.14 ♀ (syn. *nisias* Fruhstorfer, 1908)
C. sperthis (C. & R. Felder, 1865) *sperthis* (C. & R. Felder, 1865) L.K.M (3, 4). S
C. santana Moore, 1857 *malayica* (C. & R. Felder, 1865) M (3, 4). S
 ♂—*f. malayica* (C. & R. Felder, 1865)
 ♂—*f. honesta* Fruhstorfer, 1908
C. insularis (Horsfield, 1829)—xxii.27 ♀, xli.6 ♂, 7 ♀ (syn. *pseudoinularis* Fruhstorfer, 1908) L.M (3)
C. regula Evans, 1954—xxii.26 ♀, xxiv.12 ♂ (syn. *felderi* auctt.nec Distant) (M 3). [S]
C. tagalica (C. & R. Felder, 1862) *jopa* Fruhstorfer, 1908 M (3). [S]
C. tagalica labuana Evans, 1954 (syn. *tagalina* auctt.nec Fruhstorfer) T
C. thetis (Drury, 1773) *sumatrana* Corbet, 1937 Pulau Rumbia. S

Iraota Moore, 1881

- I. timoleon* (Stoll, 1790) *maecenas* (Fabricius, 1793) S
I. rochana (Horsfield, 1829) *boswelliana* Distant, 1885— M (3, 4). S
 xxii.23 ♀

	<i>I. distant</i> (Staudinger, 1889) <i>distant</i> (Staudinger, 1889)— xliv.24 ♀ (syn. <i>nila</i> Distant, 1886, praecoc.— xliv.24 ♀)	M (3, 4)
	<i>Amblypodia</i> Horsfield, 1829 (= <i>Horsfieldia</i> Riley, 1922)	
(39)	<i>A. narada</i> Horsfield, 1829, <i>taoana</i> Moore, 1879—xxi.23 ♂ <i>A. anita</i> Hewitson, 1862, <i>anita</i> Hewitson, 1862	L.K.M (3) K
	<i>Mahathala</i> Moore, 1878	
	<i>M. ameria</i> (Hewitson, 1862) <i>ariadeva</i> Fruhstorfer, 1908— xxi.30 ♀	M (3)
	<i>Arhopala</i> Boisduval, 1832 (= <i>Amblypodia</i> Auctorum)	
	<i>A. ijauensis</i> Bethune-Baker, 1897, <i>ijauensis</i> Bethune-Baker, 1897	L.K.M (4)
	<i>A. anthelus</i> (Westwood [1851]) <i>grahami</i> Corbet, 1941— xxiii.4 ♀	L.K.M (3)
	<i>A. anarte</i> (Hewitson, 1862) <i>morphicolor</i> Corbet, 1941	M (3)
	<i>A. achelous</i> (Hewitson, 1862) <i>malu</i> Corbet, 1946	Penang
	<i>A. achelous achelous</i> (Hewitson, 1862)—fig. 82 ♂	M (3). S
	<i>A. myrzala</i> (Hewitson, 1869) <i>conjuncta</i> Corbet, 1941	L
	<i>A. myrzala lammas</i> Corbet, 1941	M (3). S
(40)	<i>A. camdeo</i> (Moore, 1857) <i>camdana</i> Corbet, 1941—xxiii.11 ♀ (tails missing)	M (3, 4)
	<i>A. azata</i> Nicéville, 1896	M (3, 4)
(41)	<i>A. dispar</i> Riley & Godfrey, 1921, <i>pendleburyi</i> Corbet, 1941	M (4)
	<i>A. johoreana</i> Corbet, 1941	M (3)
	<i>A. hellada</i> Fruhstorfer, 1914, <i>ozana</i> Fruhstorfer, 1914— xxi.29 ♀	L.M (3)
	<i>A. aedias</i> (Hewitson, 1862) <i>meritatas</i> Corbet, 1941	L
	<i>A. aedias agnis</i> C. & R. Felder, 1865	K.M (3). S
	<i>A. atosia</i> (Hewitson, 1863) <i>jahara</i> Corbet, 1941	L
	<i>A. atosia malayana</i> Bethune-Baker, 1903 (syn. <i>udapa</i> Corbet, 1941)	K.M (3). S
	<i>A. pseudomuta</i> (Staudinger, 1889) <i>pseudomuta</i> (Staudinger, 1889)	M (3). S
	<i>A. allata</i> (Staudinger, 1889) <i>pandora</i> Corbet, 1941	M (3). S
(42)	<i>A. hypomuta</i> (Hewitson, 1862) <i>hypomuta</i> (Hewitson, 1862)	L.K.M (3). S
	<i>A. epimuta</i> (Moore, 1857) <i>elsiei</i> (Evans, 1925)	K
	<i>A. epimuta epiala</i> Corbet, 1941	M (3, 4). S
	<i>A. metamuta</i> (Hewitson, 1863) <i>metamuta</i> (Hewitson, 1863) —xxiii.19 ♂ (syn. <i>gunongensis</i> Bethune-Baker, 1897)	M (3, 4). S
	<i>A. avathina</i> Corbet, 1941, <i>avathina</i> Corbet, 1941	M (3). S
	<i>A. muta</i> (Hewitson, 1862) <i>merguriana</i> Corbet, 1941	L
	<i>A. muta maranda</i> Corbet, 1941	K. M (3). S
	<i>A. tropaea</i> Corbet, 1941	M (3)
	<i>A. moorei</i> Bethune-Baker, 1896, <i>busa</i> Corbet, 1941	M (3). S
	<i>A. wallacei</i> Corbet, 1941, <i>santava</i> Corbet, 1941	M (3). S
	<i>A. kurzi</i> (Distant, 1885)—xxi.1 ♂	M (3, 4). S
	<i>A. avatha</i> Nicéville, 1896	M (3)
	<i>A. zylda</i> Corbet, 1941, <i>elioti</i> Corbet, 1941	M (3)

	<i>A. moolaiana</i> (Moore, 1879) <i>maya</i> (Evans, 1932)	L
	<i>A. moolaiana jajuna</i> Corbet, 1941	K.M (3)
	<i>A. agesilaus</i> (Staudinger, 1889) <i>gesa</i> Corbet, 1941	L
	<i>A. agesilaus major</i> (Staudinger, 1889)	M (3, 4). T
	<i>A. amphimula</i> (C. & R. Felder, 1860) <i>milleriana</i> Corbet, 1941	L
	<i>A. amphimula amphimula</i> (C. & R. Felder, 1860)	K.M (3). S
	<i>A. asia</i> Nicéville, 1892	M (3)
(43)	<i>A. belphoebe</i> Doherty, 1889, <i>cowani</i> Corbet, 1941	M (3)
	<i>A. similis</i> H. H. Druce, 1895	M (3)
	<i>A. agesias</i> (Hewitson, 1862) <i>ovomaculata</i> (Hewitson, 1878)	M (3)
	<i>A. myrzalina</i> Corbet, 1941	M (3)
	<i>A. democritus</i> (Fabricius, 1793) <i>democritus</i> (Fabricius, 1793)	L.K
	<i>A. democritus lycaenaria</i> (C. & R. Felder, 1860)—xliv.18 ♀, fig.79 ♂	K.M (3). S
	<i>A. alitaeus</i> (Hewitson, 1862) <i>valika</i> Corbet, 1941	L
	<i>A. alitaeus pardenas</i> Corbet, 1941	S
	<i>A. atrax</i> (Hewitson, 1862) <i>aida</i> Nicéville, 1889	L
	<i>A. atrax atrax</i> (Hewitson, 1862)	M (3)
	<i>A. ariana</i> (Evans, 1925) <i>ariavana</i> Corbet, 1941	L.M (3)
	<i>A. havilandi</i> Bethune-Baker, 1896, <i>arianaga</i> Corbet, 1941	K.M (3)
	<i>A. myrtale</i> (Staudinger, 1889) <i>epibata</i> Corbet, 1948	S
	<i>A. rafflesii</i> Nicéville, 1890, <i>rafflesi</i> Nicéville, 1890—xxi.9 ♀, 10 ♂	M (3)
	<i>A. anella</i> Nicéville, 1895	M (3, 4)
	<i>A. silhelensis</i> (Hewitson, 1862) <i>adorea</i> Nicéville, 1890	L.M (3). S
	<i>A. zambra</i> Swinhoe, 1911, <i>zambra</i> Swinhoe, 1911—xxiii.2 ♀	L.K.M (3). S
	<i>A. apha</i> Nicéville, 1895, <i>aphadantas</i> Corbet, 1941—xxiii.17 ♂	M (3)
	<i>A. ace</i> Nicéville, 1892, <i>ace</i> Nicéville, 1892	M (3)
	<i>A. agrata</i> Nicéville, 1890, <i>agrata</i> Nicéville, 1890	K.M. (3). S
	<i>A. kounga</i> Bethune-Baker, 1896, <i>milleri</i> Corbet, 1941	L
	<i>A. kounga ridleyi</i> Corbet, 1941	K.M (3). S
	<i>A. aroa</i> (Hewitson, 1863) <i>esava</i> Corbet, 1941	L.K
	<i>A. aroa arops</i> Corbet, 1941	M (3). S
(44)	<i>A. agamemnon</i> Corbet, 1941	S
	<i>A. phaeops</i> C. & R. Felder, 1865, <i>phanda</i> Corbet, 1941	S
(45)	<i>A. azinis</i> Nicéville, 1896, <i>evansi</i> Corbet, 1941	Pulau Rumbia
(46)	<i>A. agaba</i> (Hewitson, 1862)	L.M (4)
(47)	<i>A. alea</i> (Hewitson, 1862) <i>alea</i> (Hewitson, 1862)	L
	<i>A. inornata</i> (C. & R. Felder, 1860) <i>inornata</i> (C. & R. Felder, 1860)—fig. 81 ♂ (syn. <i>brahma</i> Bethune-Baker, 1897)	M (3). S
	<i>A. antimula</i> C. & R. Felder, 1865, <i>iana</i> Corbet, 1941	L
	<i>A. antimula antimula</i> C. & R. Felder, 1865—xxiii.18 ♂ (syn. <i>davisonii</i> Nicéville, 1890)	K.M (3). S
	<i>A. perimula</i> (Moore, 1857) <i>linta</i> Corbet, 1941	L.K.M (3)
	<i>A. barami</i> Bethune-Baker, 1903, <i>penanga</i> Corbet, 1941	K.M (3). S
	<i>A. centaurus</i> (Fabricius, 1775) <i>nakula</i> (C. & R. Felder, 1860)—xxi.4 ♂, 5 ♀	L.K.M (3). S
	<i>A. cooperi</i> Evans, 1925, <i>gena</i> Corbet, 1941	K.M (3)
	<i>A. corinda</i> (Hewitson, 1869) <i>corestes</i> Corbet, 1941	L
	<i>A. corinda aestes</i> Nicéville, 1892	M (3). S

- A. aurea* (Hewitson, 1862)
 (48) *A. trogon* (Distant, 1884)—fig. 87 ♂
A. vihara (C. & R. Felder, 1860) *hirava* Corbet, 1941
A. vihara vihara (C. & R. Felder, 1860)—fig. 80 ♂
A. eumolphus (Cramer, 1780) *maxwelli* (Distant, 1885)—
 xxiii.10 ♀ [syn. *farquhari* (Distant, 1885)—
 xxiii.3 ♂]
A. horsfieldi (Pagenstecher, 1890) *eurysthenes* Fruhstorfer,
 1914
A. horsfieldi basiviridis Nicéville, 1895
 (49) *A. bella* Bethune-Baker, 1896
 (50) *A. bazaloides* (Hewitson, 1878)
A. bazalus (Hewitson, 1862) *zalinda* Corbet, 1941
A. alaconia (Hewitson, 1869) *aloana* Corbet, 1941
 (51) *A. cardoni* Corbet, 1941
A. wildeyana Corbet, 1941, *havea* Corbet, 1941
A. wildeyana wildeyana Corbet, 1941
A. agelastus (Hewitson, 1862) *agelastus* (Hewitson, 1862)
A. labuana Bethune-Baker, 1896, *labuana* Bethune-Baker,
 1896
A. epimete (Staudinger, 1889) *duessa* Doherty, 1889
A. epimete suedas Corbet, 1941
A. arvina (Hewitson, 1863) *adalitas* Corbet, 1941
A. paraganesa (Nicéville, 1882) *mendava* Corbet, 1941
A. ammon (Hewitson, 1862)—fig. 83 ♀ A.T.
A. ammonides (Doherty, 1891) *monava* Corbet, 1941
A. ammonides chunsu Fruhstorfer, 1914
A. ariel (Doherty, 1891) *antis* Corbet, 1941
A. abseus (Hewitson, 1862) *abseus* (Hewitson, 1862)
A. diardi (Hewitson, 1862) *almansor* Fruhstorfer, 1914—
 xxiii.14 ♀
A. fulgida (Hewitson, 1863) *singhapura* (Distant, 1885)—
 fig. 84 ♀
A. anniella (Hewitson, 1862) *artegal* (Doherty, 1889)
A. anniella anniella (Hewitson, 1862)—xxi.20 ♂
A. apidanus (Cramer, 1777) *ahamus* (Doherty, 1891)
A. apidanus kartaphilus Fruhstorfer, 1914—fig. 85 ♂
A. areste (Hewitson, 1862) *areste* (Hewitson, 1862)
A. morphina (Distant, 1884) *morphina* (Distant, 1884)—
 fig. 86 ♂
A. fulla (Hewitson, 1862) *ignara* Riley & Godfrey, 1921
A. fulla intaca Corbet, 1941

Surendra Moore, 1879
S. vivarna (Horsfield, 1829) *amisena* (Hewitson, 1862)—
 xxiii.13 ♂
S. florimel Doherty, 1889
 (52) *S. todara* Moore, 1884, *karennia* Evans, 1925

Semanga Distant, 1884
S. superba (H. Druce, 1873) *deliciosa* Scitz, 1926—
 xxi.13 ♀

M (3). S
 M (3). S
 L
 K.M (3)
 L.K.M (3). S

 L

 M (3, 4)
 M (3)
 L
 M (4)
 L.M (3)
 Perak
 L
 M (3). S
 L.M (3, 5). [S]
 M (3, 4)

 L
 M (3)
 M (4)
 M (4)
 M (3). S
 L
 M (3)
 M (3). S
 L.M (3). S
 L.M (3). S

 M (3). S

 L
 M (3, 4). S
 L
 K.M (3). S
 M (4)
 M (3, 4)

 L
 M (3). S

K.L.M (3, 4). S

 M (3, 4). [S]
 M (4)

L.M (3, 4). S

Loxura Horsfield, 1829

- L. atymnus* (Stoll, 1780) *fuconius* Fruhstorfer, 1912— L.K.M (2, 3). S
xxiv.7 ♂
L. cassiopeia Distant, 1884, *cassiopeia* Distant, 1884— M (3)
fig. 88 ♂, 89 ♀

Yasoda Doherty, 1889

- Y. pita* (Horsfield, 1829) *dohertyi* Fruhstorfer, 1912 K.L.M (5, 4)

Drina Nicéville, 1890

- (53) *D. donina* (Hewitson, 1865) *usira* (C. & R. Felder, 1865) L.M (3)
(54) *D. cowani* Corbet, 1940 M (3). S
D. mania (Hewitson, 1863) M (3). [S]

Spindasis Wallengren, 1857 (= *Aphnaeus* Auctorum)

- S. syama* (Horsfield, 1829) *terana* (Fruhstorfer, 1912)— K.M (3). S
xxiii.8 ♂, 9 ♀
S. lohita (Horsfield, 1829) *milleri* Corbet, 1940 L
S. lohita senama (Fruhstorfer, 1912) (syn. *kutu* Corbet, M (2, 3, 4). S
1940)

Pratapa Moore, 1881 (= *Camena* Hewitson, 1865, praecoc.,
Tajura Moore, 1881, *Dacalana* Moore, 1884)

- P. vidura* (Horsfield, 1829) *burmana* (Moore, 1884) L.K
P. vidura sinhara (Fruhstorfer, 1914)—xxi.27 ♀ M (3). [S]
P. ctesia (Hewitson, 1865) *ctesia* (Hewitson, 1865) M (4, 5)
P. blanka (Nicéville, 1895) *blanka* (Nicéville, 1895) M (3)
P. deva (Moore, 1857) *relata* (Distant, 1884)—xxi.12 ♀ M (2, 3, 4). S
(syn. *stella* Corbet, 1938)
P. icetoides (Elwes, 1893) *calculus* H. H. Druce, 1895 M (3). S
P. icetas (Hewitson, 1865) *sakaia* Corbet, 1940 M (4)
P. cleobis (Godart, 1819) *queda* Corbet, 1938 (syn. *pendle-* M (4)
buryi Corbet, 1940)
P. donatana (Nicéville, 1888) *donatana* (Nicéville, 1888) M (3, 4). S
P. yajna (Doherty, 1886) *selangorana* (Pendlebury & M (4)
Corbet, 1933)
(55) *P. illurgoides* (Nicéville, 1890) *taorana* (Corbet, 1940) M (4)
P. luculentus (Leech, 1890) *nela* (Swinhoe, 1896) M (4)
P. maculatus (Hewitson, 1865) M (4)
P. cippus (Fabricius, 1798) *maxentius* (Fruhstorfer, 1912)— L.M (3). S
xxiii.20 ♀
P. ister (Hewitson, 1865) *tussis* (H. H. Druce, 1895) M (4)
P. jalajala (C. & R. Felder, 1862) *larutensis* (Pendlebury, M (4)
1933)
P. sumia (Moulton, 1912) S
P. deudorix (Hewitson, 1869) *ingeni* Corbet, 1948 L.M (3). S
P. mantra (C. & R. Felder, 1860) *mantra* (C. & R. Felder, M (2). S.T
1860)—xxi.11 ♀
P. isanus (Hewitson, 1865) *verna* (Corbet, 1940) M (3)
P. dominus (H. H. Druce, 1895) *dominus* (H. H. Druce, M (2). S
1895)

	<i>P. buto</i> (Nicéville, 1886) <i>cowani</i> (Corbet, 1940)	M (2). S
	<i>P. elioti</i> (Corbet, 1940) <i>elioti</i> (Corbet, 1940)	M (4)
	<i>P. cleoboides</i> (Elwes, 1892) <i>viga</i> (Corbet, 1940)	K.M (3, 4)
(56)	<i>P. stigmata</i> (H. H. Druce, 1904)	M (4)
	<i>Charana</i> Nicéville, 1890	
	<i>C. jalindra</i> (Horsfield, 1829) <i>burbona</i> (Hewitson, 1878)	L.M (3, 4). S
(57)	<i>C. mandarinus</i> (Hewitson, 1863) subsp.	M (4)
(58)	<i>Jacoona</i> Distant, 1884 (= <i>Neocheritra</i> Distant, 1885, <i>Thrix</i> Doherty, 1891, <i>Manto</i> Nicéville, 1895)	
	<i>J. anasuja</i> (C. & R. Felder, 1865) <i>anasuja</i> (C. & R. Felder, 1865)—xx.15 ♀, xxi.15 ♂	M (3). S
	<i>J. amrita</i> (C. & R. Felder, 1860) <i>amrita</i> (C. & R. Felder, 1860)—xxiii.12 ♂	M (3, 4). S
	<i>J. scopula</i> (H. Druce, 1873) <i>nisibis</i> (Nicéville, 1895)	M (3, 4)
	<i>J. fabronia</i> (Hewitson, 1878)	M (4)
	<i>J. hypoleuca</i> (Hewitson, 1865) <i>terana</i> (Seitz, 1926)	M (3, 4). S
	<i>J. gama</i> (Distant, 1886) <i>gama</i> (Distant, 1886)—fig. 128 ♀	M (3, 4). S
	<i>Purlisa</i> Distant, 1881	
	<i>P. giganteus</i> (Distant, 1881) <i>giganteus</i> (Distant, 1881)—xxi.28 ♀	L.M (4). S
	<i>Suasa</i> Nicéville, 1890	
	<i>S. lisides</i> (Hewitson, 1863) <i>suessa</i> Nicéville, 1892	K.M (3)
	<i>Neomyrina</i> Distant, 1884	
	<i>N. nivea</i> (Godman & Salvin, 1878) <i>periculosa</i> Fruhstorfer, 1913—xxii.13 ♀	L.M (3, 4)
	<i>Cheritra</i> Moore, 1881	
	<i>C. freja</i> (Fabricius, 1793) <i>freja</i> (Fabricius, 1793)	L
	<i>C. freja frigga</i> Fruhstorfer, 1912—xx.10 ♀	M (3). S
	<i>Ticherra</i> Nicéville, 1887	
(59)	<i>T. acta</i> (Moore, 1857)	K
	<i>Ritra</i> Nicéville, 1890	
	<i>R. aurea</i> (H. Druce, 1873) <i>volumnia</i> (Fruhstorfer, 1912)	M (3)
	<i>R. cinesia</i> (Hewitson, 1863) <i>cinesoides</i> (Nicéville, 1889)	M (3)
	<i>Marmessus</i> Hübner [1819] (= <i>Biduanda</i> Distant, 1884)	
(60)	<i>M. scaeva</i> (Hewitson, 1863) <i>melisa</i> (Hewitson, 1869)	L
	<i>M. scaeva scaeva</i> (Hewitson, 1863)	L.K.M (4). [S]
	<i>M. estella</i> (Hewitson, 1863) <i>semperna</i> Corbet, 1944	L.M (4)

	<i>M. theda</i> (C. & R. Felder, 1862) <i>renonga</i> (Corbet, 1938)	K.L
	<i>M. theda thesmia</i> (Hewitson, 1863)—fig. 76 ♂, 77 ♀	K.M (3, 4). S
	<i>M. scudderii</i> (Doherty, 1889) <i>biranta</i> Riley, 1942	L
	<i>M. scudderii perlisa</i> Riley, 1942	K
	<i>M. ravindra</i> (Horsfield, 1829) <i>moorei</i> (Distant, 1882)— xx.21 ♂, 20 ♀, 30 ♀	L.K.M (3, 4). S
	<i>M. rufolaenia</i> Fruhstorfer, 1912, <i>rufolaenia</i> Fruhstorfer, 1912—xliv.11 ♀	S
	<i>Eooxylides</i> Doherty, 1889	
	<i>E. tharis</i> (Geyer, 1837) <i>distanti</i> Riley, 1942—xx.19 ♀	M (3, 4). S
	<i>Thamala</i> Moore, 1879	
	<i>T. marciana</i> (Hewitson, 1863) <i>sarupa</i> Corbet, 1944	L
	<i>T. marciana marciana</i> (Hewitson, 1863)—xxiii.16 ♀	K.M (3). [S]. T
	<i>Horaga</i> Moore, 1881	
	<i>H. albimacula</i> (Wood-Mason & Nicéville, 1881) <i>malaya</i> Corbet, 1941	L.K.M (2, 3, 4). S
	<i>H. amethystus</i> H. H. Druce, 1902, <i>purpurescens</i> Corbet, 1941	M (3, 4)
	<i>H. onyx</i> (Moore, 1857) <i>halba</i> Distant, 1886—xliv.23 ♂	M (2). S
(61)	<i>H. syrinx</i> (C. Felder, 1860) <i>maenala</i> (Hewitson, 1869)	L.M (2, 3, 4). S
	<i>H. araolina</i> Evans, 1933	Pulau Angsa
	<i>Catapaecilma</i> Butler, 1879	
	<i>C. elegans</i> (H. Druce, 1873) <i>zephyria</i> Fruhstorfer, 1915	L.M (3)
	<i>C. major</i> H. H. Druce, 1895, <i>emas</i> Fruhstorfer, 1912— xxii.17 ♂ (syn. <i>lyana</i> Fruhstorfer, 1915—xxii.17 ♂)	M (3). S
(62)	<i>C. subochrea</i> Elwes, 1893, <i>evansi</i> Pendlebury, 1933	M (3)
	<i>C. bubases</i> (Hewitson, 1875)—xliv.26 ♀	M (3)
	<i>Chliaria</i> Moore, 1884	
	<i>C. kina</i> (Hewitson, 1869) <i>celastroides</i> Corbet, 1938	M (4)
	<i>C. othona</i> (Hewitson, 1865) <i>matiana</i> Fruhstorfer, 1912	K
	<i>C. othona pahanga</i> Corbet, 1938	M (4)
	<i>C. tora</i> (Kheil, 1884) <i>semanga</i> Corbet, 1940	M (3, 4)
	<i>C. balua</i> Moulton, 1911, <i>gabrielis</i> Corbet, 1938	M (3)
	<i>C. amabilis</i> Nicéville, 1895, <i>lisba</i> Corbet, 1948	M (3, 4)
	<i>C. merguia</i> Doherty, 1889, <i>skapane</i> (H. H. Druce, 1895)	M (3)
	<i>Hypolycaena</i> C. & R. Felder, 1862	
	<i>H. thecloides</i> (C. & R. Felder, 1860) <i>thecloides</i> (C. & R. Felder, 1860)—fig. 78 ♂	M (3). S
	<i>H. erylus</i> (Godart, 1819) <i>teatus</i> Fruhstorfer, 1912—xx.5 ♂ 6 ♀	L.M (1, 2, 3). S
	<i>Zelus</i> Nicéville, 1890	
	<i>Z. amasa</i> (Hewitson, 1865) <i>maximilianus</i> Fruhstorfer, 1912—xx.23 ♂	K.M (3). S

	<i>Remelana</i> Moore, 1884	
	<i>R. jangala</i> (Horsfield, 1829) <i>travana</i> (Hewitson, 1865)— xxii.4 ♀	M (3, 4). S
	<i>Artipe</i> Boisduval, 1870	
(63)	<i>A. eryx</i> (Linnaeus, 1771) subsp.	M (2)
	<i>Deudorix</i> Hewitson, 1863	
(64)	<i>D. elioti</i> Corbet, 1940	S
	<i>D. epijarbas</i> (Moore, 1857) <i>cinnabarus</i> Fruhstorfer, 1912— xli.5 ♂	L.K.M (3, 4). S
	<i>D. hypargyria</i> (Elwes, 1893) <i>hypargyria</i> (Elwes, 1893)	M (3, 4)
	<i>Virachola</i> Moore, 1881	
(60)	<i>V. smilis</i> (Hewitson, 1863) <i>smilis</i> (Hewitson, 1863)	M (4)
	<i>Rapala</i> Moore, 1881	
	<i>R. subguttata</i> Elwes, 1893, <i>malaya</i> Pendlebury & Corbet, 1933	M (4, 5). S
	<i>R. abnormis</i> Elwes, 1893, <i>abnormis</i> Elwes, 1893	M (4). S
	<i>R. domitia</i> (Hewitson, 1863) <i>domitia</i> (Hewitson, 1863)— xxiii.7 ♂	L.M (3, 4). S
	<i>R. kessuma</i> (Horsfield, 1829) <i>deliochus</i> (Hewitson, 1874)	L.M (3). S
	<i>R. pheretima</i> (Hewitson, 1863) <i>sequeira</i> (Distant, 1885)— xxiii.21 ♀ [syn. <i>utimutis</i> (Distant, 1885)—xxiii.22 ♂]	L.K.M (2, 3). S
	<i>R. dioetas</i> (Hewitson, 1863) <i>barthema</i> (Distant, 1885)	L.M (3). S
	<i>R. dieneces</i> (Hewitson, 1878) <i>dieneces</i> (Hewitson, 1878)— xliv.1 ♂	L.M (3). S
	<i>R. drasmos</i> H. H. Druce, 1895, <i>cowani</i> Corbet, 1939	S (mangrove)
	<i>R. iarbus</i> (Fabricius, 1787) <i>iarbus</i> (Fabricius, 1787)— xxiv.15 ♂, xx.26 ♀ (poor) (syn. <i>ocerta</i> Fruhstorfer, 1912—xliv.2 ♀)	L.K.M (3). S
	<i>R. manea</i> (Hewitson, 1863) <i>chozeba</i> (Hewitson, 1863)	L.M (2). S
	<i>R. scintilla</i> Nicéville, 1890 <i>scintilla</i> Nicéville, 1890	M (2, 3)
	<i>R. varuna</i> (Horsfield, 1829) <i>orsei</i> (Hewitson, 1863)	L.M (3). S
	<i>R. elcia</i> (Hewitson, 1863) <i>rhoecus</i> Nicéville, 1895	L.K.M (3)
	<i>R. nissa</i> (Kollar, 1844) <i>pahangana</i> Pendlebury & Corbet, 1933	M (4, 5)
	<i>Sinthusa</i> Moore, 1884	
	<i>S. malika</i> (Horsfield, 1829) <i>amata</i> Distant, 1886—xliv.20 ♀	L.M (3, 4)
	<i>S. nasaka</i> (Horsfield, 1829) <i>amba</i> (Kirby, 1878)—xliv.12, 19 (syn. <i>amboides</i> Elwes, 1893)	L.M (3)
	<i>Bindahara</i> Moore, 1881	
	<i>B. phocides</i> (Fabricius, 1793) <i>phocides</i> (Fabricius, 1793)— xx.25 ♀ (syn. <i>collenettei</i> Corbet, 1940)	L.M (3, 4). S

Araotes Doherty, 1889

- A. lapithis* (Moore, 1857) *uruwela* Fruhstorfer, 1912— L.K.M (3). [S]
xx.29 ♀

Sithon Hübner [1819]

- S. nedymond* (Cramer, 1780) *ismarus* Fruhstorfer, 1912 L.
S. nedymond nedymond (Cramer, 1780)—xxii.1 ♂, xxiii.15 ♀ M (3). [S]

Subfamily LIPHYRINAE

Liphyra Westwood, 1864

- L. brassolis* Westwood, 1864, *abbreviata* Strand, 1911— M (3). S
xxii.18 ♀

Family HESPERIIDAE

Subfamily COELIADINAE

Bibasis Moore, 1881 (= *Ismene* Swainson, 1820, *paracoc.*)

- (65) *B. oedipodea* (Swainson, 1820) *oedipodea* (Swainson, 1820) M (2). [S]
B. jaina (Moore, 1866) *margana* (Fruhstorfer, 1911) M (3)
[*velva* (Evans, 1932), *partim*]
(66) *B. tuckeri* (Elwes & Edwards, 1897) M (3)
B. etelka (Hewitson, 1867) M (2). [S]
B. harisa (Moore, 1866) *consobrina* (Plötz, 1884)— M (2). S
xxxiv.22 ♂ [syn. *moncada* (Fruhstorfer, 1911),
distanti (Evans, 1932)]
(67) *B. gomata* (Moore, 1866) *laliata* (Fruhstorfer, 1911) Perak
B. sena (Moore, 1866) *uniformis* Elwes & Edwards, 1897 K.M (3)

Hasora Moore, 1881

- H. mus* Elwes & Edwards, 1897, *pahanga* Evans, 1926 M (4, 5)
H. lizetta (Plötz, 1884)—xxxv.3 ♂ (syn. *hadria* Nicéville, M (4). S
1889)

H. salanga (Plötz, 1885)

H. myra (Hewitson, 1867) *funebis* Evans, 1932

H. zoma Evans, 1934

H. chromus (Cramer, 1780) *chromus* (Cramer, 1780)

H. taminatus (Hübner, 1818) *malayana* (C. & R. Felder, L.M (3, 4). S
1860)—xxxv.2 ♀ (not the Malayan race)

H. schoenherri (Latreille, 1824) *chuza* (Hewitson, 1867)

H. mixta (Mabille, 1876) *prabha* Fruhstorfer, 1911

H. badra (Moore, 1857) *badra* (Moore, 1857)

H. quadripunctata (Mabille, 1876) *gnaeus* (Plötz, 1884)

H. vitta (Butler, 1870) *vitta* (Butler, 1870)—xxxv.4 ♂ [syn. M (3, 4). S
chabrona (Plötz, 1884)]

*(68) *H. khoda* (Mabille, 1876) *maris* Evans, 1934

H. khoda (Mabille, 1876) *minsona* (Swinhoe, 1907)

H. leucospila (Mabille, 1891) *leucospila* (Mabille, 1891)

Perak

Perak

M (4)

Badamia Moore, 1881

B. exclamationis (Fabricius, 1775)

M (3). S

	<i>Choaspes</i> Moore, 1881 (= <i>Rhopalocampa</i> Auctorum)	
	<i>C. plateni</i> (Staudinger, 1888) <i>caudata</i> Evans, 1932	M (3). [S]
	<i>C. subcaudata</i> (C. & R. Felder, 1867) <i>crawfurdi</i> (Distant, 1882)—xxxiv.26 ♂	M (3). S
(69)	<i>C. hemixanthus</i> Rothschild, 1903, <i>furcata</i> Evans, 1932	M (4)
	Subfamily PYRGINAE	
	(a) <i>Celaenorrhinus</i> Group	
	<i>Capila</i> Moore, 1866	
	<i>C. phanaeus</i> (Hewitson, 1867) <i>ferrea</i> Evans, 1934—xxxv.18 ♂ (Burmese race)	L.M (3). [S]
(70)	<i>C. pieridoides</i> (Moore, 1878) <i>sofa</i> Evans, 1934	M (4)
	<i>Charmion</i> Nicéville, 1894	
	<i>C. ficulnea</i> (Hewitson, 1868) <i>queda</i> (Plötz, 1885)	M (3)
	<i>Celaenorrhinus</i> Hübner [1819]	
*(71)	<i>C. putra</i> (Moore, 1878) <i>sanda</i> Evans, 1941	L
	<i>C. asmara</i> (Butler, 1877) <i>asmara</i> (Butler, 1877)—xxxv.28 ♂	L.K.M (3). S
(72)	<i>C. inaequalis</i> Elwes & Edwards, 1897, <i>irene</i> Evans, 1941	M (4)
	<i>C. aurivittata</i> (Moore, 1879) <i>cameroni</i> (Distant, 1882)—xxxiv.19	L.K.M (3, 4)
	<i>C. ladana</i> (Butler, 1870)	M (3)
	(b) <i>Tagiades</i> Group	
	<i>Tapena</i> Moore, 1881	
	<i>T. thwaitesi</i> Moore, 1882, <i>bornea</i> Evans, 1941	M (3)
	<i>Darpa</i> Moore, 1865	
	<i>D. striata</i> (H. Druce, 1873) <i>striata</i> (H. Druce, 1873)	K.M (3)
	<i>D. pteria</i> (Hewitson, 1868) <i>dealbata</i> (Distant, 1886)—xxxv.21 ♂	M (4)
	<i>Odina</i> Mabilie, 1891	
	<i>O. hieroglyphica</i> (Butler, 1870) <i>ortina</i> Evans, 1941—xliv.25 ♂	M (3). S
	<i>Sarangesa</i> Moore, 1881	
	<i>S. dasahara</i> (Moore, 1866) <i>dasahara</i> (Moore, 1866)	L.K
	<i>Coladenia</i> Moore, 1881	
	<i>C. dan</i> (Fabricius, 1787) <i>dhyana</i> Fruhstorfer, 1909—xxxv.27 ♂	M (2, 3)
(73)	<i>C. agni</i> (Nicéville, 1884) <i>igna</i> (Semper, 1892)	Malaya
	<i>C. laxmi</i> (Nicéville, 1889) <i>sabrina</i> Elwes & Edwards, 1897	M (3)
(74)	<i>C. palawana</i> (Staudinger, 1889)	M (4)

	<i>Satarupa</i> Moore, 1865	
	<i>S. gopola</i> Moore, 1866, <i>Malaya</i> Evans, 1932	K.M (4, 5)
	<i>Seseria</i> Matsumura, 1910	
	<i>S. affinis</i> (H. Druce, 1873) <i>kirmana</i> (Plötz, 1885) [syn. <i>cognata</i> (Distant, 1886)—xxxv.17 ♂]	M (3)
	<i>Pintara</i> Evans, 1932	
(75)	<i>P. pinwilli</i> (Butler, 1877) <i>pinwilli</i> (Butler, 1877)—xxxv.29 ♂	M (3)
	<i>Daimio</i> Murray, 1875	
	<i>D. simca</i> (C. & R. Felder, 1862) <i>minima</i> Swinhoe, 1910	M (3)
	<i>D. limax</i> (Plötz, 1884) <i>dirae</i> Nicéville, 1895	M (3). S
	<i>Mooreana</i> Evans, 1926	
	<i>M. trichoneura</i> (C. & R. Felder, 1860) <i>trichoneura</i> (C. & R. Felder, 1860)—xxxiv.20 ♀	K.M (3)
	<i>Tagiades</i> Hübner [1819]	
	<i>T. japetus</i> (Stoll, 1781) <i>atticus</i> (Fabricius, 1793)—xxxiv.1 ♂ (syn. <i>ulanus</i> Plötz, 1885)	L.K.M (3). S
	<i>T. gana</i> (Moore, 1866) <i>gana</i> (Moore, 1866)—xxxiv.2 ♂ (syn. <i>menanto</i> Plötz, 1885, <i>perakana</i> Fruhstorfer, 1910)	L.K.M (2, 3). S
	<i>T. parra</i> Fruhstorfer, 1910, <i>naxos</i> Evans, 1949	M (3)
	<i>T. lavata</i> Butler, 1877—xxxiv.5 ♂	M (3, 4)
	<i>T. toba</i> Nicéville, 1896, <i>toba</i> Nicéville, 1896	K.M (3)
	<i>T. litigiosa</i> Möschler, 1878, <i>litigiosa</i> Möschler, 1878	L.K
	<i>T. ultra</i> Evans, 1932, <i>ultra</i> Evans, 1932	M (3). [S]
	<i>T. calligana</i> Butler, 1877—xxxiv.6 ♂	M (3). S
	<i>T. waterstradti</i> Elwes & Edwards, 1897, <i>talanga</i> Evans, 1949	M (4)
	<i>T. menaka</i> (Moore, 1866) <i>manis</i> Evans, 1933	M (4)
	<i>T. cohaerens</i> Mabille, 1914, <i>cinda</i> Evans, 1933	M (4)
	<i>Odontoptilum</i> Nicéville, 1890	
	<i>O. angulata</i> (C. Felder, 1862) <i>angulata</i> (C. Felder, 1862)—xxxiv.16 ♀	K.M (3). S
	<i>O. pygela</i> (Hewitson, 1868) <i>pygela</i> (Hewitson, 1868)—xxxiv.18 ♂	M (3)
	Subfamily <i>HESPERIINAE</i>	
	(a) <i>Astictopterus</i> Group	
	<i>Astictopterus</i> C. & R. Felder, 1860	
	<i>A. jama</i> (C. & R. Felder, 1860) <i>jama</i> (C. & R. Felder, 1860) [syn. <i>melania</i> (Plötz, 1885)]	K.M (2, 3). S

<i>Arnetta</i> Watson, 1893		
	<i>A. verones</i> (Hewitson, 1878)	K.M (3)
<i>Aeromachus</i> Nicéville, 1890		
(76)	<i>A. jhora</i> (Nicéville, 1885) <i>creta</i> Evans, 1943	M (4)
*(77)	<i>A. dubius</i> Elwes & Edwards, 1897, <i>javanicus</i> Elwes & Edwards, 1897	M (4)
	<i>A. pygmaeus</i> (Fabricius, 1775)	K
<i>Ampittia</i> Moore, 1881		
	<i>A. dioscorides</i> (Fabricius, 1793) <i>camertes</i> (Hewitson, 1868) —xxxv.14 ♂, 15 ♀	K.M (3). S
<i>Halpe</i> Moore, 1878		
(78)	<i>H. zema</i> (Hewitson, 1877) <i>ormenes</i> (Plötz 1886)	M (3, 4)
(79)	<i>H. zola</i> Evans, 1937, <i>zamba</i> Corbet, 1940	M (3). S
(80)	<i>H. insignis</i> (Distant, 1886) —xxxv.22 ♂	M (2). [S]
(81)	<i>H. sikkima</i> Moore, 1882 (syn. <i>selangora</i> Swinhoe, 1913)	M (3)
*(82)	<i>H. porus</i> (Mabille, 1876)	Penang
*(83)	<i>H. homolea</i> (Hewitson, 1868) <i>homolea</i> (Hewitson, 1868) —xxxv.23 ♂	M (4)
(84)	<i>H. arcuata</i> Evans, 1937	M (4)
(85)	<i>H. flava</i> Evans, 1926	K.M (3)
	<i>H. auriferus</i> (Elwes & Edwards, 1897) <i>auriferus</i> (Elwes & Edwards, 1897)	M (3)
(86)	<i>H. auriferus</i> (Elwes & Edwards, 1897) <i>toxopea</i> Evans, 1932	M (3)
*(87)	<i>H. kusala</i> Fruhstorfer, 1911	
	<i>H. pelethronix</i> Fruhstorfer, 1910, <i>pelethronix</i> Fruhstorfer, 1910	M (3, 4) M (3)
(88)	<i>H. wantona</i> Swinhoe, 1893 (syn. <i>confusa</i> Evans, 1932)	
(89)	<i>H. veluvana</i> Fruhstorfer, 1911, <i>brevicornis</i> Evans, 1932	L.M (3)
*(90)	<i>H. hieron</i> Nicéville, 1894	Perak
<i>Pithauria</i> Moore, 1878		
	<i>P. stramineipennis</i> Wood-Mason & Nicéville, 1887, <i>stramineipennis</i> Wood-Mason & Nicéville, 1887 —xxxv.9 ♂	K.M (3)
*(91)	<i>P. murdava</i> (Moore, 1866)	[S]
	<i>P. marsena</i> (Hewitson, 1866)	K.M (3)
(b) <i>Ancistroides</i> Group		
<i>Iambrix</i> Watson, 1893		
	<i>I. salsala</i> (Moore, 1866) <i>salsala</i> (Moore, 1866) —xxxiv.21 ♂	L.K.M (2, 3). S
	<i>I. stellifer</i> Butler, 1877	L.K.M (3). S
	<i>I. distant</i> Shepard, 1937 —xxxv.11 ♂ [syn. <i>unicolor</i> (Distant, 1886), <i>praeocc.</i> —xxxv.11 ♂]	L.M (3). S
(92)	<i>I. obliquans</i> (Mabille, 1893) <i>obliquans</i> (Mabille, 1893) —xxxv.30 ♂ (syn. <i>sindu</i> Auctorum nec C. & R. Felder)	M (3). S

<i>Koruthaia</i> Watson, 1893	
(93) <i>K. rubecula</i> (Plötz, 1882) <i>rubecula</i> (Plötz, 1882)— xxxiv.28 ♂	L.K.M (3)
<i>K. butleri</i> (Nicéville, 1884) [syn. <i>nigerrima</i> (Swinhoe, 1919)]	K.M (3)
<i>K. sindu</i> (C. & R. Felder, 1860) <i>sindu</i> (C. & R. Felder, 1860) [syn. <i>xanthes</i> (Butler, 1870)]	M (3, 4)
<i>Sancus</i> Nicéville, 1891 (= <i>Psolas</i> Staudinger, 1889, pre-occupied)	
<i>S. fuligo</i> (Mabille, 1876) <i>fuligo</i> (Mabille, 1876) (syn. <i>pulligo</i> Auctorum nec Mabille)	I..K.M (3). S
<i>Ancistroides</i> Butler, 1874 (= <i>Kerana</i> Distant, 1886)	
<i>A. nigrita</i> (Latreille, 1824) <i>maura</i> (Snellen, 1880)— xxxiv.8 ♂	L.K.M (3). S
<i>A. armatus</i> (H. Druce, 1873) <i>armatus</i> (H. Druce, 1873)— xxxv.31 ♂	M (3, 4)
<i>A. gemmifer</i> (Butler, 1877) <i>gemmifer</i> (Butler, 1877)— xxxiv.29 ♂	M (3, 4). [S]
<i>A. fulgur</i> (Nicéville, 1894)	M (4)
<i>Notocrypta</i> Nicéville, 1889	
<i>N. paralyssos</i> (Wood-Mason & Nicéville, 1881) <i>asawa</i> Fruhstorfer, 1911	L.K
<i>N. paralyssos varians</i> (Plötz, 1882)—xxxiv.7 ♂	M (2, 3). S.T
<i>N. quadrata</i> Elwes & Edwards, 1897	M (3, 4)
<i>N. pria</i> (H. Druce, 1873)	K.M (3)
<i>N. clavata</i> (Staudinger, 1889) <i>clavata</i> (Staudinger, 1889) (syn. <i>devadatta</i> Fruhstorfer, 1911)	L.K.M (3). S
<i>N. curvifascia</i> (C. & R. Felder, 1862) <i>corinda</i> Evans, 1949	M (3, 4)
<i>N. feisthameli</i> (Boisduval, 1832) <i>alyssos</i> (Moore, 1866)	M (3, 4, 5)
<i>Udaspes</i> Moore, 1881	
<i>U. folus</i> (Cramer, 1775)—xxxiv.3 ♂	K.M. (2, 3) S
(c) <i>Plastingia</i> Group	
<i>Suada</i> Nicéville, 1895	
<i>S. suerva</i> (Nicéville, 1884) <i>suava</i> Evans, 1949	M (3)
<i>Scobura</i> Elwes & Edwards, 1897	
<i>S. phiditia</i> (Hewitson, 1866)	M (3)
<i>S. isola</i> (Swinhoe, 1893)	M (3)
<i>Suastus</i> Moore, 1881	
<i>S. gremius</i> (Fabricius, 1798) <i>gremius</i> (Fabricius, 1798)	K. Province Wellealey
<i>S. minuta</i> (Moore, 1877) <i>aditia</i> Evans, 1943	L
<i>S. everys</i> (Mabille, 1883) <i>everys</i> (Mabille, 1883) [syn. <i>tripura</i> (Nicéville, 1891)]	M (3, 4)

<i>Cupitha</i> Moore, 1884	
<i>C. purpurea</i> (Moore, 1877)	M (3)
<i>Zographetus</i> Watson, 1893 (= <i>Gehenna</i> Watson, 1893)	
<i>Z. satwa</i> (Nicéville, 1884)	K.M (3)
<i>Z. ogygia</i> (Hewitson, 1866) <i>ogygia</i> (Hewitson, 1866)	M (2)
<i>Z. ogygia</i> (Hewitson, 1866) <i>ogygioides</i> Elwes & Edwards, 1897	L.M (3, 4). S
<i>Z. rama</i> (Mabille, 1876) [syn. <i>graeae</i> (Nicéville, 1895)]	L.M (3)
<i>Oerane</i> Elwes & Edwards, 1897	
<i>O. microthyrsus</i> (Mabille, 1883) <i>neaera</i> (Nicéville, 1891)	M (3)
<i>Hyarotis</i> Moore, 1881 (= <i>Ilys</i> Nicéville, 1895)	
<i>H. adrastus</i> (Stoll, 1780) <i>praba</i> (Moore, 1866)—xxxiv.4 ♂	L.M (3). S
<i>H. microstictum</i> (Wood-Mason & Nicéville, 1887) <i>microstictum</i> (Wood-Mason & Nicéville, 1887)	L.M (3)
(94) <i>H. iadera</i> (Nicéville, 1895)	M
<i>Quedara</i> Swinhoe, 1907	
<i>Q. monteithi</i> (Wood-Mason & Nicéville, 1887) <i>monteithi</i> (Wood-Mason & Nicéville, 1887)	L.M (3). S
<i>Isma</i> Distant, 1886 (= <i>Sepa</i> Nicéville, 1894)	
<i>I. protoctlea</i> (Herrich Schäffer, 1869) <i>iapis</i> (Nicéville, 1890)	L.K.M (3)
<i>I. obscura</i> Distant, 1886, <i>obscura</i> Distant, 1886—xxxv.19 ♂	M (3). [S]
<i>I. cronus</i> (Nicéville, 1894)	M (4)
<i>I. feralia</i> (Hewitson, 1868) <i>lenya</i> (Evans, 1932)	M (3)
<i>I. miosticta</i> (Nicéville, 1891)	L.K.M (3)
<i>I. umbrosa</i> (Elwes & Edwards, 1897) <i>umbrosa</i> (Elwes & Edwards, 1897)	L.M (3, 4, 5)
<i>I. guttulifera</i> (Elwes & Edwards, 1897) [syn. <i>kuala</i> (Evans, 1932), <i>damocles</i> (Evans, 1939)]	M (3, 4)
<i>I. bononoides</i> (H. H. Druce, 1912)	M (3)
<i>I. bononia</i> (Hewitson, 1868) <i>bononia</i> (Hewitson, 1868)—xxxv.20 ♀ (syn. <i>inarime</i> Nicéville, 1891)	L.M (3). [S]
<i>Platingia</i> Butler, 1870	
<i>P. helena</i> Butler, 1870, <i>natuna</i> Fruhstorfer, 1909	L.M (3)
<i>P. flavia</i> Staudinger, 1889, <i>fruhstorferi</i> Mabille, 1893	M (3)
<i>P. latoia</i> (Hewitson, 1868) <i>latoia</i> (Hewitson, 1868)—xxxv.26 ♀	M (2, 3). S
(95) <i>P. klanga</i> Evans, 1941	M (3)
<i>P. derna</i> Evans, 1941	M (3). [S]
<i>P. callineura</i> (G. & R. Felder, 1867) <i>niasana</i> Fruhstorfer, 1909 (syn. <i>perakana</i> Evans, 1926)	K.M (3). [S]
<i>P. aurantiaca</i> Elwes & Edwards, 1897, <i>montivaga</i> Pendlebury, 1939	M (5)

	<i>P. naga</i> (Nicéville, 1884)	M (3). S
	<i>P. pellonia</i> Fruhstorfer, 1909	M (3). [S]
	<i>P. tavoyana</i> Evans, 1926	L.M (2)
	<i>P. sala</i> (Hewitson, 1866)	M (3). [S]. T
	<i>P. fuscicornis</i> (Elwes & Edwards, 1897)	L
	<i>P. corissa</i> (Hewitson, 1876) <i>indrasana</i> (Elwes & Nicéville, 1887)	M (3)
	<i>P. pugnans</i> (Nicéville, 1891)	K.M (3, 4). S
	<i>Lotongus</i> Distant, 1886	
	<i>L. calathus</i> (Hewitson, 1876) <i>calathus</i> (Hewitson, 1876) -- xxxiv.14 ♀ (syn. <i>maculatus</i> Distant, 1886—xxxv.1 ♂)	L K.M (3)
	<i>L. onara</i> (Butler, 1870) <i>adorabilis</i> Fruhstorfer, 1911	L.M (3)
	<i>L. onara</i> (Butler, 1870) <i>solex</i> (Evans, 1939)	M (3)
	<i>L. avesta</i> (Hewitson, 1868)	M (3)
	<i>Zela</i> Nicéville, 1895	
(96)	<i>Z. zeus</i> Nicéville, 1895, <i>zeus</i> Nicéville, 1895	M (3)
	<i>Z. zero</i> Evans, 1932, <i>elioti</i> Evans, 1939	L
	<i>Z. zenon</i> (Nicéville, 1895) <i>cowani</i> Evans, 1939	M (3). S
(97)	<i>Z. smaragdinus</i> (H. H. Druce, 1912)	M (3)
	<i>Gangara</i> Moore, 1881 (= <i>Paduka</i> Distant, 1886)	
	<i>G. thyrsis</i> (Fabricius, 1775) <i>thyrsis</i> (Fabricius, 1775)—xxxiv.13 ♂	M (2, 3). [S]
	<i>G. sanguinoculus</i> (Martin, 1895)	M (3)
	<i>G. lebadea</i> (Hewitson, 1868) <i>lebadea</i> (Hewitson, 1868) [syn. <i>glandulosa</i> (Distant, 1886)—xxxv.5 ♂]	M (2). S
	<i>Erionota</i> Mabille, 1878	
	<i>E. sybirta</i> (Hewitson, 1876)—xxxv.24 ♂	M (3). [S]
	<i>E. acroleucus</i> (Wood-Mason & Nicéville, 1881) <i>apex</i> Semper, 1892	M (3). S
	<i>E. torus</i> Evans, 1941—xxxiv.17 ♂	M (2, 3). S
	<i>E. thrax</i> (Linnaeus, 1767) <i>thrax</i> (Linnaeus, 1767)	L.M (2, 3). S
	<i>E. harmachis</i> (Hewitson, 1878) [syn. <i>staudingeri</i> (Distant, 1886)—xxxv.26 ♂]	M (3)
	<i>Ge</i> Nicéville, 1895	
	<i>G. geta</i> Nicéville, 1895	L.M (2)
	<i>Matapa</i> Moore, 1881	
	<i>M. aria</i> (Moore, 1866)—xxxv.8 ♀	M (2, 3). S
	<i>M. crista</i> Evans, 1948 (syn. <i>druna</i> Evans, 1932 nec Moore)	M (2, 3)
	<i>M. sasiparna</i> (Moore, 1866)	K.M (3)
	<i>M. druna</i> (Moore, 1866) (syn. <i>shalgrama</i> Nicéville, 1884, et Auctorum)	K.M (2, 3)

	<i>Unkana</i> Distant, 1886 (= <i>Zea</i> Distant, 1886)	
	<i>U. ambasa</i> (Moore, 1857) <i>batara</i> Distant, 1886— xxxiv.11 ♂, 30 ♀	L.M (2, 3). S
	<i>U. mythea</i> (Hewitson, 1877) <i>mythea</i> (Hewitson, 1877)— xxxv.7 ♂	M (3)
	<i>Hidari</i> Distant, 1886	
(98)	<i>H. irava</i> (Moore, 1857)—xxxiv.15 ♀	K.M (2, 3). S
	<i>H. bhawani</i> Nicéville, 1889	L
	<i>Eetion</i> Nicéville, 1895	
	<i>E. elia</i> (Hewitson, 1866)—xxxiv.25 ♀ [syn. <i>eburus</i> (Plötz, 1885), <i>ayankara</i> Fruhstorfer, 1911]	L.M (3). S
	<i>Acerbas</i> Nicéville, 1895	
	<i>A. anthea</i> (Hewitson, 1868) <i>anthea</i> (Hewitson, 1868)— xxxv.32 ♀ [syn. <i>ciliatus</i> (Butler, 1877)]	M (3). [S]
	<i>A. martini</i> (Distant & Pryer, 1887) [syn. <i>nitidifasciata</i> Elwes & Edwards, 1897]	L.K.M (3)
	<i>Pirdana</i> Distant, 1886	
	<i>P. hyela</i> (Hewitson, 1867) <i>rudolphii</i> Elwes & Nicéville, 1887—xxxv.6 ♀	M (4)
	<i>P. distantii</i> Staudinger, 1889, <i>distantii</i> Staudinger, 1889	M (3)
	(d) Taractrocera Group	
	<i>Taractrocera</i> Butler, 1870	
(92)	<i>T. ardonia</i> (Hewitson, 1868) <i>sumatrensis</i> Evans, 1926	M (3). [S]
	<i>T. archias</i> (C. Felder, 1860) <i>quinta</i> Swinhoe, 1912— xxxv.16 ♂	M (3)
(92, 99)	<i>T. aliena</i> (Plötz, 1883) <i>aliena</i> (Plötz, 1883)	M
	<i>T. ziclea</i> (Plötz, 1884) <i>zenia</i> Evans, 1934	Penang
	<i>Oriens</i> Evans, 1932	
	<i>O. paragola</i> (Nicéville, 1896)	L.M (3)
	<i>O. golooides</i> (Moore, 1882) [syn. <i>naranata</i> (Distant, 1886)— xxxv.13 ♂]	K.M (3)
	<i>O. gola</i> (Moore, 1877) <i>pseudolus</i> (Mabille, 1883)	K.M (2, 3). S
	<i>Potanthus</i> Scudder, 1872 (= <i>Padraona</i> Moore, 1881)	
	<i>P. rectifasciata</i> (Elwes & Edwards, 1897)	M (4)
	<i>P. trachala</i> (Mabille, 1878) <i>tyleri</i> (Evans, 1914) [syn. <i>ino</i> (Evans, 1932)]	K.M (2, 3, 4). S
	<i>P. juno</i> (Evans, 1932) <i>juno</i> (Evans, 1932)	L.M (3, 4). S
	<i>P. omaha</i> (W. H. Edwards, 1863) <i>omaha</i> (W. H. Edwards, 1863)—xxxiv.24 ♀ [syn. <i>maesoides</i> (Butler, 1877)]	L.K.M (2, 3). S
(92)	<i>P. confucius</i> (C. & R. Felder, 1862) <i>dushta</i> (Fruhstorfer, 1911) [syn. <i>tropica</i> (Evans nec Plötz)]	K.M (2, 3, 4). S
(100)	<i>P. pava</i> (Fruhstorfer, 1911) <i>pava</i> (Fruhstorfer, 1911)	L
	<i>P. lydia</i> (Evans, 1934) <i>fraseri</i> (Evans, 1934)	M (4)

	<i>P. ganda</i> (Fruhstorfer, 1911) <i>ganda</i> (Fruhstorfer, 1911)	L.K.M (3, 4)
	<i>P. hetaerus</i> (Mabille, 1883) <i>serina</i> (Plötz, 1883)	S
	<i>Telicota</i> Moore, 1881	
	<i>T. colon</i> (Fabricius, 1775) <i>stinga</i> Evans, 1949—xxxiv.23 ♂ (syn. <i>colon</i> Evans nec Fabricius, 1934, <i>vaja</i> Corbet, 1942, partim)	K.M (2, 3). S
	<i>T. augias</i> (Linnaeus, 1763) <i>augias</i> (Linnaeus, 1763) (syn. <i>bunga</i> Evans, 1934, partim)	M (2, 3). S
	<i>T. linna</i> Evans, 1947, <i>bina</i> Evans, 1949 (syn. <i>bambusae</i> Auctorum et Evans, nec Moore, 1934)	M (3). S
	<i>T. ohara</i> (Plötz, 1883) <i>jix</i> Evans, 1949—xxxv.12 ♀ (syn. <i>formosana</i> Evans nec Moore, 1934)	M (3)
	<i>T. ancilla</i> (Herrich-Schäffer, 1869) <i>bambusae</i> (Moore, 1878)	M (2)
	<i>Cephrenes</i> Waterhouse & Lyell, 1914	
	<i>C. chrysozona</i> (Plötz, 1883) <i>niasica</i> (Plötz, 1886)	M (2). S
	(e) Pelopidas Group	
	<i>Parnara</i> Moore, 1881	
	<i>P. guttatus</i> (Bremer & Gray, 1853) <i>apostata</i> (Snellen, 1880)	M (3, 4)
	<i>P. naso</i> (Fabricius, 1798) <i>bada</i> (Moore, 1878)	L.M (3). S
*(101)	<i>P. ganga</i> Evans, 1937	[S]
	<i>Borbo</i> Evans, 1949	
	<i>B. cinnara</i> (Wallace, 1866)	M (3, 4). S
	<i>Pelopidas</i> Walker, 1870	
(102)	<i>P. agna</i> (Moore, 1866) <i>agna</i> (Moore, 1866)	K.M (2, 3, 4). S
	<i>P. thrax</i> (Hübner, 1821) <i>flava</i> (Evans, 1926)	Penang
	<i>P. mathias</i> (Fabricius, 1798) <i>mathias</i> (Fabricius, 1798)— xxxv.10 ♂	K.M (2, 3, 4). S
	<i>P. assamensis</i> (Nicéville, 1882)	K.M (3)
	<i>P. conjuncta</i> (Herrich-Schäffer, 1869) <i>conjuncta</i> (Herrich- Schäffer, 1869)—xxxiv.12 ♂	M (3)
	<i>Polytremis</i> Mabille, 1904	
	<i>P. lubricans</i> (Herrich-Schäffer, 1869) <i>lubricans</i> (Herrich- Schäffer, 1869)—xxxiv.9 ♂ [syn. <i>contigua</i> (Mabille, 1877)]	K.M (2, 3). S
(103)	<i>P. minuta</i> (Evans, 1926)	M (3)
(104)	<i>P. discreta</i> (Elwes & Edwards, 1897) <i>discreta</i> (Elwes & Edwards, 1897)	M (4)
	<i>P. ellola</i> (Hewitson, 1869) <i>corbeti</i> Evans, 1937	M (4, 5)
	<i>Baoris</i> Moore, 1881	
	<i>B. farri</i> (Moore, 1878) <i>farri</i> (Moore, 1878)	K.M (3, 4). S
	<i>B. oenia</i> (Hewitson, 1868)	M (2). S
(105)	<i>B. panicillata</i> Moore, 1881, <i>chapmani</i> Evans, 1937	K

<i>Callotis</i> Swinhoe, 1893		
*(106)	<i>C. brunnea</i> (Snellen, 1876) <i>caere</i> (Nicéville, 1891)	M (3)
	<i>C. sirius</i> (Evans, 1926) <i>fusca</i> (Evans, 1932)	M (4)
	<i>C. cahira</i> (Moore, 1877) <i>austeni</i> (Moore, 1883)	M (2, 3). S
	<i>C. bromus</i> (Leech, 1894) <i>bromus</i> (Leech, 1894)	Perak
	<i>C. cormasa</i> (Hewitson, 1876)—xxxiv.10 ♂	K.M (3). S
	<i>C. malaya</i> (Evans, 1926)	M (3). S
	<i>C. tulsii</i> (Nicéville, 1884) <i>tulsii</i> (Nicéville, 1884)	M (4)
(107)	<i>C. plebeia</i> (Nicéville, 1887)	M (3)
	<i>C. philippina</i> (Herrich-Schäffer, 1869) <i>philippina</i> (Herrich-Schäffer, 1869)	S
<i>Iton</i> Nicéville, 1895		
	<i>I. semamora</i> (Moore, 1866) <i>semamora</i> (Moore, 1866)	L.M (3)

NOTES ON THE SYNONYMIC LIST

(1) Although *Papilio ascanius* Linnaeus, 1768, has priority over *Papilio aristolochiae* Fabricius, 1775, the Linnaean name has never been used in this connection, while *Papilio ascanius* Cramer, 1775, is in use for an American Papilionid. Strict application of the law of priority would cause such confusion and inconvenience that an application has been made to the International Commission on Zoological Nomenclature for its suspension in this instance.

(2) It appears that the further ♀ forms figured in Distant [*agenor* Linnaeus 1758—xxix.1 ♀, *phoenix* Distant, 1885—xxvii.B.7 ♀, and *vinus* Fruhstorfer, 1902—xxix.5 ♀ (syn. *cilix* Distant, 1885, praecoc.—xxix.4 ♂, 5 ♀)] occur in Malaya as very rare aberrations.

(3) ♂, "Thaiping, Perak. McArthur." H. McArthur spent the winter months of 1888–1889 in Malaya, between visits to the north-west Himalayas, where he collected butterflies for J. H. Leech.

(4) 2 ♂, "Perak, Maxwell's Hill, 2,000 feet, 1913–1923 (*C. T. Johnson*)."

(5) ♂, "Perak, 1913–1923 (*C. T. Johnson*)."

(6) *Papilio licea* (p. 20) has page priority over *Papilio iudith* (p. 22) in Fabricius, 1785, *Mantissa Insectorum*, 2, but, in 1793, *Ent. Syst.*, 3 (1) : 202 Fabricius placed *licea* under *P. iudith* [sic].

(7) The Fabrician name *pomona* was published at Easter, 1775, and so has to be regarded as having priority over Cramer's name *crocale*, which was published at some undetermined, but almost certainly later, date in 1775.

(8) The Malayan records for this species are considered very doubtful. The species was recorded from Borneo by Moulton (1915, *Entomologist*, 48 : 97), but we have seen no specimens from this island.

(9) Although it is generally considered that C. & R. Felder, *Reise Novara Rhopalocera*, part 3, was published in 1865, and thus precedes Butler's Monograph of the genus *Euploea* in 1866 (*Proc. zool. Soc. Lond.*, 1866 : 268–302), it is by no means certain that this is the case. The Malayan names affected are *castelnau* C. & R. Felder as against *phoebus* Butler, *erichsonii* C. & R. Felder

against *crassa* Butler, and *E. redtenbacheri* C. & R. Felder for the collective species as against *E. camaralzaman* Butler.

(10) The Malayan records of *E. core* forms *penanga* Talbot, 1940 (♂, "Penang Hill, 1,200 feet, 8.ii.1989," ex Coll. Brodie) and *godartii* Lucas, 1853—iii.8 ♂ (♂, "Singapore (*Wallace*)") are not convincing, and it is certain that these forms are not indigenous to Malaya. The unique ♂ type of *graminifera* (Moore, 1883), from "Malaise," is nearest to Tonkin specimens of *E. core*.

(11) ♂, "Perak (*H. Fruhstorfer*)."

(12) 3 ♂♂, North Kedah, Sungai Lasor and Sungai Pial, 1945 & 1947 (*J. A. Hislop*).

(13) The type species of *Mycalasis* Hübner, 1818, is *Papilio francisca* Stoll, selected by Hemming (1937, *Proc. R. ent. Soc. Lond.* (B) 6: 149).

(14) The type of *distanti* (Moore, 1891), described from "Selangor," is a male which agrees with wet-season specimens of *M. intermedia* from Burma.

(15) According to Article 36 of the International Rules, this name (published in June, 1886) is not invalidated on account of its similarity to *Paduka* Distant, April, 1886, as Moore supposed when he redescribed the genus under the name *Ducapa* in 1900.

(16) The specimen of *Cirrochroa clagia* (Godart, 1819) figured by Distant (xvii.7 ♂) is certainly of Sumatran origin.

(17) The identity of *Papilio allita* Fabricius must be regarded as doubtful as the type is lost. The type locality is more likely to be Malaya than Sumatra (Cf. Butler, 1870, *Catalogue of diurnal Lepidoptera described by Fabricius*: London, page 117).

(18) The type of *Cethosia logani* Distant, 1881—viii.5 ♂, is almost certainly of Sumatran origin.

(19) *Papilio aonis* (p. 472) has page priority over *Papilio lemonias* (p. 473) in 1758, *Syst. Nat.*, Edition X, but Linnaeus dropped the former name in his later works.

(20) ♂, Johore, Lombong, 20.xi.1938 (*C. F. Cowan*).

(21) ♂, Malaya (no further locality). In Coll. Corbet, received from Miss Skinner, Kuala Lumpur.

(22) f. or ab. *penerka* Talbot & Corbet, 1947; (♀, North Perak, Ulu Ijok, 3,500 feet, ii.1932 (*Capt. Holloway, Vernay Expedition*): altitude may be incorrect. Uperside with whitish post-discal fascia, and the hindwing blue border obsolete.

(23) Distant's figure of ♀-f. *floralis* Fruhstorfer, 1913—xviii.7 ♀, is based on a specimen in the British Museum which is almost certainly of Sumatran origin. There is no evidence that this form occurs in Malaya.

(24) There may be a second species in Malaya closely allied to *E. phemius* (Pendlebury, 1939).

(25) Only known from the male and female types from Perak and stated to be in Coll. L. Martin, Diessen, Germany.

(26) The male and female types ("Taiping, *McArthur*") and a female ("Malay Peninsula"), all ex Coll. Rothschild, agree with specimens from Assam.

(27) 3 ♂♂, "Perak, ex Crowley Bequest," and ♂, "Selangor, ex Coll. W. H. Evans," undoubtedly represent different races.

(28) The male holotype of *Poritia heurisoni marakata* Corbet, 1940, is labelled "Malay Peninsula, ex Coll. Davidson," but probably came from Sikkim or Assam.

(29) ♀, Selangor, 3.viii.1936 (*J. N. Eliot*).

(30) ♀, Negri Sembilan, Port Dickson, 18.xi.1932 (*H. M. Pendlebury*).

(31) ♂ nec "♀" Holotype, Langkawi Islands, Pulau Dayang Bunting, 1.ix.1932 (*A. S. Corbet*); ♀, Langkawi Islands, 18.ix.1941 (*M. J. V. Miller*):

also Perak, limestone cliffs near Ipoh (*G. C. Stubbs*). There is some doubt as to whether *Lycaena potanini* Alph., 1889, has priority over *Everes umbriel* Doherty, 1889 (see Elwes, 1892, *Proc. zool. Soc. Lond.*, 1892 : 624).

(32) ♂ Holotype (unique), Pulau Tioman, vi-vii.1916 (*H. C. Robinson & C. B. Kloss*) : not dissected.

(33) ♀, Penang (*Pinwill*) ; ♂, Trengganu, 12.x.1899 (*R. E. Evans, Skeat Expedition*) ; ♀, Perlis, Kaki Bukit, 8.i.1939 (*C. F. Cowan*).

(34) The name *hylax* was formerly, but incorrectly, applied to *Pithecopis cornus* Fruhstorfer (Corbet, 1940h).

(35) ♂, Pulau Tioman, 1931 (*Malay Collector*).

(36) Dissection of the type material now in the British Museum has shown that some of the name-types of *Nacaduba* species have been misidentified. It has been found that *N. hermus* (C. Felder) = *N. nabo* Toxopeus, 1929, and Corbet, 1938, and that *N. lysa* Fruhstorfer = *N. hermus* Corbet, 1938 nec C. Felder : *akaba* (H. Druce) has proved to be the Bornean race of *N. berenice* and not of *N. heroe*, as was formerly supposed.

(37) ♀, Penang Hill (recorded by de Nicéville & Martin, 1896 : 444) ; ♀, "Straits Settlements, ex Coll. Joicey."

(38) ♀ Holotype (unique), Pahang, Cameron Highlands, Batu Brinchang, 6,600 feet, 21.vii.1938 (*H. M. Pendlebury*) ; ♀ Pine Tree Hill, 1952 (*J. A. Hislop*).

(39) ♂, Perlis, Kolam Road, 6.i.1939 & 18.xi.1951 (*C. F. Cowan*).

(40) ♀ Holotype, Malacca (*Pinwill*) ; ♂, Selangor, Bukit Kutu, 3,485 feet, 18.iii.1931 (*A. S. Corbet*).

(41) ♀ Holotype (unique), Pahang, Cameron Highlands, Gunong Terbakar, 4,481 feet, 27.vii.1938 (*H. M. Pendlebury*).

(42) Hewitson described this species from "India," but there is little doubt that the type was obtained on Singapore Island by Wallace. The same remark applies to *A. atrax* (Hewitson) and *A. agelastus* (Hewitson). The type of *Rapala kessuma deliochus* (Hewitson) is another Wallace specimen (probably from Singapore), but it was described from "East India."

(43) ♂ Holotype (unique), Selangor-Pahang, Ginting Simpah, 20.ii.1937 (*C. F. Cowan*) ; ♀, Perak, Maxwell's Hill, 3,500 feet, 12.vi.1953 (*C. F. Cowan*).

(44) ♂ Holotype (unique), Singapore, 28.ii.1937 (*J. N. Eliot*).

(45) ♂ Holotype (unique), Perak, Sembilan Islands, Pulau Rumbia, iii.1926, ex Coll. W. H. Evans.

(46) ♀, Langkawi Islands, 15.ii.1941 (*M. J. V. Miller*) ; Perak-Pahang, between Jor Camp and Lubok Tamang, 3,000 feet, 21.x.1923 (*H. M. Pendlebury*).

(47) 2 ♂♂, Langkawi Islands, 15.ii.1941 & 28.iii.1941 (*M. J. V. Miller*).

(48) *A. aurea* and *A. trogon* may be conspecific.

(49) ♀, South Johore, 1.xii.1938 (*J. N. Eliot*).

(50) ♂, Langkawi Islands, 4.ii.1940 (*M. J. V. Miller*).

(51) ♂, Holotype (unique), Perak, x.1929 (*Fr. R. Cardon*).

(52) ♀, Pahang, Fraser's Hill, 4,000 feet, 30.x.1939 (*A. W. G. Wildey*).

(53) ♂, Holotype, "Malacca Interior" (*Castelnau*) ; ♂, Langkawi Islands, 1.iii.1940 (*M. J. V. Miller*).

(54) ♂, Johore, Kota Tinggi, 3.i.1937 (*C. F. Cowan*) ; ♂, Johore, Lombong, 3.vii.1938 (*C. F. Cowan*).

(55) ♀ Holotype (unique), Pahang, Cameron Highlands, 4,800 feet, 29.i.1924 (*M. A. Henderson*).

(56) ♂, Selangor, Bukit Kutu, 3,400-3,500 feet, viii.1915 ; ♀, same locality and altitude, 6.ix.1929 (*H. M. Pendlebury*).

(57) ♀, Selangor, Bukit Kutu, 3,500 feet, 7.ix.1929 (*H. M. Pendlebury*).

(58) The type species of *Thrix* Doherty is *Thrix gama* Doherty nec Distant,

1891 [= *Neocheritra nisibis* Nicéville, 1895]. Doherty misidentified the male of the Malayan race of the species, now known as *Jacoona scopula*, as the unknown male corresponding to Distant's *Neocheritra gama* female.

(59) ♂, Perlis, Kaki Bukit, 8.i.1939 (C. F. Cowan).

(60) Species which were almost certainly taken by Wallace on Mount Ophir but described by Hewitson from elsewhere are *Marmessus scaeva* (described from "Singapore"), *Catapaecilma bubases* ("Malacca"), *Virachola smilis* ("East India") and *Halpe homolea* ("Singapore").

(61) ♀ Holotype (unique), Selangor, Pulau Angsa, ex Selangor Museum.

(62) ♀ Holotype, "Malacca" [probably Mount Ophir] (Wallace). Also known from ♀, Borneo, Quop (Moulton, 1912, *J. Straits Br. R. anat. Soc.*, 60: 61.)

(63) ♀, Selangor, Kuala Lumpur, 14.vii.1914, ex Coll. Agric. Dept S.S. & F.M.S.; 2 ♂, Pahang, Fraser's Hill, 1953 (*J. A. Hislop*)

(64) ♂ Holotype, Singapore, 8.v.1938 (*J. N. Eliot*) : ♀ Allotype, Singapore (G. Meade-Waldo).

(65) A Perak specimen in the Selangor Museum, recorded as *Ismene velva* by Evans, 1932. The type locality of *velva* Evans, 1932, is Borneo, and not Perak as stated in Evans, 1932: vi

(66) ♂, Perak, Jor Camp, 2,000 feet, 1.ix.1922.

(67) ♂, Perak, ix.1922, ex Coll. Evans.

(68) ♀ Holotype (unique), "Perak (*Lakatt & Pamboo*)," ex Coll. Oberthür; recte Tavoy.

(69) ♂, Perak, ex Colls. Swinhoe and Joicey; ♂, Perak, Maxwell's Hill, 4,500 feet, 16.ix.1929 (*A. S. Corbet*).

(70) ♂ Holotype (unique), Selangor-Pahang, Semangko Pass, ex Coll. Adams.

(71) ♂♀, "Perak, vi-vii.1895" (*Lakatt & Pamboo*), ex Coll. Oberthür; recte Tavoy; Langkawi Islands, 1.1939 (*J. N. Eliot*).

(72) ♂ Holotype (unique), Perak, Gunong Ijau, ex Coll. Evans.

(73) The Malayan record in Evans, 1932: 341 is believed to be based on a specimen in the Selangor Museum but, in the absence of more precise information, the Malayan status of the species must be considered doubtful.

(74) ♂, Perak, i-ii.1890 (*W. Doherty*), ex Colls. Elwes and Joicey; Fraser's Hill, 1953 (*J. A. Hislop*).

(75) ♂ Holotype, Malacca (*Pinwill*), the only known specimen from Malaya.

(76) ♀, Pahang, Fraser's Hill, 4,000 feet, 27.viii.1921 (*C. L. Collenette*), identity confirmed by examination of the genitalia; common, Gap, Selangor, 12.ii.37 and at Fraser's Hill, July and Nov. 1953 (*C. F. Cowan*).

(77) [The specimen on which this record was based proves to be in fact a ♂ *A. jhora creta* Evans, under which name it was correctly first recorded—N.D.R.]

(78) ♂, Selangor, Bukit Kutu, 3,485 feet, 14.iii.1931 (*A. S. Corbet*); ♂, Selangor, Kuala Sleh, 24.vii.1932 (*A. S. Corbet*).

(79) ♂ Holotype, Selangor, 5.viii.1936 (*J. N. Eliot*); ♂, Selangor, Ulu Langat, 30.v.1928 (*A. S. Corbet*).

(80) ♂, Singapore, 22.viii.1885, ex Coll. Rothschild. ♂, Negri Sembilan, 12 miles north of Gemas, 10.vi.1937 (*C. F. Cowan*).

(81) ♂ ♀ types of *selangora* Swinhoe, Selangor, ex Coll. Swinhoe; ♂, Perak, Jor Camp Falls, 1,400 feet, 5.i.1939 (*C. F. Cowan*); ♀, Johore, 36 miles north-west of Johore Bahru, 2.x.1938 (*C. F. Cowan*).

(82) ♂, "Penang, 1895 (*Lakatt & Pamboo*)," ex Coll. Oberthür; recte Tavoy.

(83) ♂, "Singapore" [probably Mount Ophir] (Wallace). This specimen has different genitalia from the other subspecies, and it probably represents

a distinct race. Its Malayan origin must be considered doubtful, however, for the species is not otherwise found nearer Malaya than Assam and China.

(84) ♂, Selangor, Bukit Kutu, 3,500 feet, 24.iii.1928 (*A. S. Corbet*) ; ♂, Pahang, Fraser's Hill, 4,100 feet, 29.v.1937 ; ♀, Pahang, Fraser's Hill, Pine Tree Hill, 4,200 feet, 29.v.1937 (*C. F. Cowan*).

(85) ♂, Selangor, Ulu Langat, 23.iii.1930 (*A. S. Corbet*) ; ♀, Selangor, Ulu Langat, 12.v.1937 (*J. N. Eliot*) ; ♂, Perlis, Kaki Bukit Ridge, 1,500 feet, 7.i.1939 (*C. F. Cowan*).

(86) 2 ♂♂, Perak, i-ii.1890 (*W. Doherty*), ex Coll. Oberthür (ssp. *toxopea*) ; ♂, Johore, Kota Tinggi (*J. N. Eliot*) (ssp. *auriferus*).

(87) ♂, "Penang, 1895 (*Lakatt & Pamboo*)," ex. Coll. Oberthür; *recte* Tavoy.

(88) ♂, Selangor, Ulu Langat, 9.vi.1937 (*J. N. Eliot*).

(89) ♂, Selangor, Kuala Sleh, 11.xi.1930 (*A. S. Corbet*) ; ♂, Langkawi Islands, i.1931 (*Idrus bin Abdullah*).

(90) ♂, "Perak (*H. Fruhstorfer*),"

(91) ♂, "Singapore (*Wallace*)."

(92) The Felder types of *Koruthaialos sindu*, *Taractrocera archias*, *T. antalcidas* [formerly used for *T. aliena* (Pl.)] and *Potanthus confucius* have been recognised in the Felder Collection in the Tring Museum, and it has been found that these names have been wrongly applied in the past (for example by Evans, 1932).

(93) ♀, Negri Sembilan, Bukit Tangga, 1,300 feet, 1.iii.1931 (*A. S. Corbet*).

(94) ♂ Holotype, Penang, in Calcutta Museum ; ♀, Malay Peninsula (*Adams*), ex Coll. Rothschild.

(95) ♂ Holotype, Perak (*W. Doherty*), ex Coll. Oberthür ; ♂, Selangor, Kuala Sleh, 5.viii.1929 (*A. S. Corbet*).

(96) ♀, Negri Sembilan, near Tampin, 23.ix.1926 (*J. W. Scharff*).

(97) ♀, Johore, Kangkar Dohol, 15.xii.1938 (*C. F. Cowan*).

(98) ♂, Langkawi Islands, iv.1928 (*H. M. Pendlebury*) ; ♀. 28.ii.41 (*M. J. V. Miller*).

(99) ♂, "Malay," ex Colls. H. H. Druce and Joicey ; ♀, Malacca, 1904 (*J. Waterstradt*) ex Coll. Oberthür.

(100) ♀, Langkawi Islands, 15.iv.1928 (*H. M. Pendlebury*).

(101) ♂, "Singapore," ex Coll. Rothschild.

(102) ♂, Penang, ex Coll. Evans.

(103) 2 ♂♂ (including Holotype), Perak, Jor, 2,000 feet, viii.1932.

(104) ♀, Perak, Larut Hills, 3,700-4,000 feet, 10.ii.1932 (*H. M. Pendlebury*) ; ♂, Perak, Larut Hills, 4,000 feet, 28.v.1928 (*J. E. Kempe*).

(105) ♂ ♀, Perlis, Kaki Bukit, i.1939 (*C. F. Cowan*).

(106) ♂, "Perak (*H. Fruhstorfer*)."

(107) ♂ ♀ in cop., Selangor, Gombak Valley, 900 feet, 1.vii.1928 (*A. S. Corbet*).

CENSUS OF SPECIES AND RACES OF BUTTERFLIES RECORDED FROM THE MALAY PENINSULA

(Omitting the 16 species and 1 subspecies asterisked in the Synonymic List)

<i>Family and Subfamily</i>		<i>Species</i>	<i>Races</i>	
PAPILIONIDAE		44	3	
PIERIDAE	— PIERINAE	30	11	} 44 + 12
	COLIADINAE	14	1	
DANAIIDAE		34	5	
SATYRIDAE		53	5	
AMATHUSIIDAE		25	—	
NYMPHALIDAE		140	22	
LIBYTHEIDAE		1	—	
RIODINIDAE		16	1	
LYCAENIDAE	— PORITIINAE	15	—	} 332 + 37
	MILETINAE	23	1	
	LYCAENINAE	89	2	
	THEGLINAE	204	34	
	LIPHYRINAE	1	—	
HESPERIIDAE	— COELIADINAE	24	—	} 209 + 4
	PYRGINAE	36	—	
	HESPERIINAE	149	4	
TOTAL		898	89	

LIST OF FOOD PLANTS OF MALAYAN RHOPALOCERA

In the following list, the generic names of the food plants of the Malayan species of Rhopalocera are listed in alphabetic order under families. Not all the recorded food plants occur in Malaya. The Malay names of the Malayan species are given in Ridley (1922-1925) and in Watson (1928).

Family PAPILIONIDAE

MAGNOLIACEAE : *Michelia*.

ANONACEAE : *Anona*, *Guatteria*, *Polyalthia* and *Saccopetalum*.

RUTACEAE : *Acronychia*, *Citrus*, *Glycosmis*, *Murraya*, *Triphasia* and *Zanthoxylum*.

ARISTOLOCHACEAE : *Apama* and *Aristolochia*.

PIPERACEAE.

LAURACEAE : *Alseodaphne*, *Cinnamomum*, *Litsea* and *Machilus*.

HERNANDIACEAE : *Hernandia* and *Illigera*.

Family PIERIDAE

Subfamily PIERINAE

CAPPARIDACEAE : *Capparis* and *Crataeva*.

RUBIACEAE : *Nauclea*.

LORANTHACEAE : *Loranthus*.

Subfamily COLIADINAE

LEGUMINOSAE : *Acacia*, *Albizia*, *Bauhinia*, *Butea*, *Caesalpinia*, *Cassia*, *Pithecellobium*, *Sesbania*, *Tephrosia* and *Wagatea*.

Family DANAIDAE

APOCYNACEAE : *Aganosma*, *Ichnocarpus*, *Melodinus*, *Nerium* and *Strophanthus*.

ASCLEPIADACEAE : *Asclepias*, *Calotropis*, *Ceropegia*, *Cryptolepis*, *Ischnostemma* and *Raphistemma*.

ARISTOLOCHACEAE : *Aristolochia*.

MORACEAE : *Ficus*.

Family SATYRIDAE

PALMACEAE : *Calamus* and *Cocos*.

GRAMINEAE : *Bambusa* and *Oryza*.

Family AMATHUSIIDAE

MUBACEAE : *Musa*.

SMILACACEAE : *Smilax*.

PALMACEAE : *Cocos*.

PANDANACEAE : *Pandanus*.

GRAMINEAE : *Bambusa*, *Imperata* and *Saccharum*.

Family NYMPHALIDAE

DILLENIACEAE : *Dolima*.

ANNONACEAE : *Oxymitra*.

MENISPERMACEAE : *Tinospora*.

VIOLACEAE : *Rinorea* and *Viola*.

PORTULACACEAE : *Portulaca*.

FLACOURTIACEAE : *Flacourtia* and *Hydnocarpus*.

MALVACEAE.

TILIACEAE : *Grewia*.

RUTACEAE : *Acronychia*.

SAPINDACEAE : *Erioglossum*.

ANACARDIACEAE : *Anacardium* and *Mangifera*.

LEGUMINOSAE : *Acacia*, *Adenanthera*, *Albizzia*, *Caesalpinia*, *Mimosa* and *Pterocarpus*.

BARRINGTONIACEAE : *Careya*.

MELASTOMATACEAE : *Clidemia* and *Melastoma*.

PASSIFLORACEAE : *Adenia* (*Modecca*) and *Passiflora*.

RUBIACEAE : *Mussaenda*, *Nauclea* and *Wendlandia*.

COMPOSITAE : *Artemisia* and *Blumea*.

EBENACEAE : *Diospyros*.

ACANTHACEAE : *Graptophyllum*, *Hygrophila*, *Pseuderanthemum* and *Strobilanthes*.

LORANTHACEAE : *Loranthus*.

EUPHORBIACEAE : *Antidesma*, *Glochidion*, *Phyllanthus*, *Ricinus* and *Tragia*.

URTICACEAE : *Debregeasia*, *Elatostema* and *Girardinia*.

ULMACEAE : *Gironniera*.

MORACEAE : *Artocarpus*, *Conocephalus* and *Ficus*.

SALICACEAE : *Salix*.

SMILACACEAE : *Smilax*.

Family LIBYTHEIDAE

ULMACEAE : *Celtis*.

Family RIODINIDAE

MYRSINACEAE : *Maesa* and *Myrsine*.

Family LYCAENIDAE

Subfamily PORITHINAE

Food plant unknown in Malaya.

Subfamily MILETINAE

One species known to feed on Aphididae.

Subfamily LYCAENINAE

MALPIGHIAEAE : *Hiptage*.

RUTACEAE : *Glycosmis*.

MELIACEAE : *Heynea*.

RHAMNACEAE : *Ziziphus*.

SAPINDACEAE : *Nephelium* and *Schleichera*.

LEGUMINOSAE : *Alysicarpus*, *Butea*, *Cajanus*, *Cassia*, *Crotalaria*, *Cytista*, *Dolichos*, *Mimosa*, *Phaseolus*, *Trifolium*, *Xylia* and *Zornia*.

RUBIACEAE : *Gardemia*.

AMARANTHACEAE : *Amaranthus*.

CYCADACEAE : *Cycas*.

Subfamily THECLINAE

OLACACEAE : *Olex*.

RHAMNACEAE : *Ziziphus*.

SAPINDACEAE : *Nephelium* and *Schleichera*.

HIPPOCASTANACEAE : *Aesculus*.
 LEGUMINOSAE : *Acacia*, *Albizzia*, *Pongamia* and *Xylia*.
 SAXIFRAGACEAE : *Astilbe* and *Saxifraga*.
 COMBRETACEAE : *Quisqualis* and *Terminalia*.
 MYRTACEAE : *Eugenia* and *Psidium*.
 MELASTOMATACEAE : *Melastoma*.
 LYTHRACEAE : *Lagerstroemia*.
 RUBIACEAE : *Nauclea* (*Sarcocephalus*) and *Vangueria*.
 CONVULVULACEAE.
 VERBENACEAE : *Lantana*.
 ELAEAGNACEAE : *Elaeagnus*.
 LORANTHACEAE : *Loranthus*.
 EUPHORBIACEAE : *Antidesma*.
 MORACEAE : *Ficus*.
 ORCHIDACEAE : *Rhynchosstylis*.
 DIOSCOREACEAE : *Dioscorea*.

Family HESPERIIDAE

Subfamily COELIADINAE

LEGUMINOSAE : *Millettia*, *Derris* and *Pongamia*.
 COMBRETACEAE : *Combretum*.
 ARALIACEAE : *Schefflera* and *Trevesia*.
 MYRSINACEAE : *Embelia*.
 MYRISTICACEAE : *Horsfieldia*.
 ZINGIBERACEAE : *Zingiber*.

Subfamily PYROGINAE

BOMBACACEAE : *Ceiba*.
 MALVACEAE : *Hibiscus* and *Urena*.
 CONVULVULACEAE.
 VERBENACEAE : *Clerodendron*.
 AMARANTACEAE : *Achyranthes*.
 DIOSCOREACEAE : *Dioscorea*.
 ROXBURGHACEAE.

Subfamily HESPERIINAE

COMBRETACEAE : *Combretum* and *Terminalia*.
 RUBIACEAE : *Psychotria*.
 LOGANIACEAE : *Fagraea*.
 ZINGIBERACEAE : *Curcuma* and *Zingiber*.
 MUSACEAE : *Musa*.
 LILIACEAE : *Cordytine* and *Dracaena*.
 PALMACEAE : *Calamus*, *Caryota*, *Cocos*, *Daemonorops* and *Eugeissona*.
 PANDANACEAE : *Pandanus*.
 ARACEAE : *Colocasia*.
 GRAMINEAE : *Cymbopogon*, *Bambusa*, *Dendrocalamus*, *Imperata*, *Oryza*, *Paspalum*, *Saccharum* and *Zea*.

BIBLIOGRAPHY

In the following Bibliography only those works are listed to which specific reference is made in the text, e.g., under Basic Literature.

With the exception of two or three journals which ceased publication before 1900 or were first issued after 1933, all the abbreviations used in the following Bibliography are those given in *A World List of Scientific Periodicals in the Years 1900-1933* (Oxford), second edition, 1934.

- ALSTON, A. H. G. (1938). The Kandy Flora. Colombo.
- BEIRNE, B. P. (1942a). The morphology of the male genitalia of the Lepidoptera. *Ent. Rec.*, 54 : 17-22, 37-39.
- (1942b). The morphology of the female genitalia of the Lepidoptera. *Ent. Rec.*, 54 : 81-83.
- BENNETT, N. H. (1950). A revision of the *echerius* group of the genus *Abisara*. *Entomologist* 83 : 1-9, 34-42.
- BETHUNE-BAKER, G. T. (1903). A revision of the *Amblypodia* group of butterflies of the family *Lycaenidae*. *Trans. zool. Soc. Lond.*, 17 : 3-164.
- BIGGS, L. C. (1881). Butterflies in Malaya. *Monthly Packet*, 2 : 181-192.
- BUTLER, A. G. (1867). Descriptions of new or little-known species of Asiatic Lepidoptera. *Ann. Mag. nat. Hist.* (iii), 20 : 399-405.
- (1877). The butterflies of Malacca. *Trans. Linn. Soc. Lond. Zool.* (ii) 1 : 533-568.
- CARDON, F. (1927). *J. Malayan Br. Asiat. Soc.* 5 : 314.
- CARPENTER, G. D. H. (1941). The relative frequency of beak-marks on butterflies of different edibility to birds. *Proc. zool. Soc. Lond.* (A), 111 : 223-230.
- COMSTOCK, J. H. (1918). The wings of insects. New York.
- CORBET, A. S. (1933). The forms of *Elymnias kunstleri* Honr. *Stylops*, 2 : 130-133.
- (1936). The genera of Lycaenopsini. *Proc. R. ent. Soc. Lond.* (B), 5 : 185-186.
- (1937a). Observations on species of Papilionidae, Pieridae and Danaidae from the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (B), 6 : 45-52.
- (1937b). Observations on species of Satyridae and Amathusiidae from the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (B), 6 : 96-99.
- (1937c). Observations on species of Nymphalidae and Riodinidae from the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (B), 6 : 99-104.
- (1937d). A revision of the Malayan species of *Curetis* Hübner. *Proc. R. ent. Soc. Lond.* (B), 6 : 224-233.
- (1937e). A revision of the Malayan species of *Celastrina*. *Trans. R. ent. Soc. Lond.*, 86 : 19-33.
- (1938a). A revision of the Malayan species of *Pratapa* Moore. *Proc. R. ent. Soc. Lond.* (B), 7 : 166-172.
- (1938b). A revision of the Malayan species of the *Nacaduba* group of genera. *Trans. R. ent. Soc. Lond.*, 87 : 125-146.
- (1938c). New *Celastrina* and *Taraka* forms from the Malay Peninsula. *Trans. R. ent. Soc. Lond.*, 87 : 161-164.
- (1939a). A revision of the Malayan species of *Miletus* Hübner (= *Gerydus* Boisduval). *Proc. R. ent. Soc. Lond.* (B), 8 : 25-31.

- CORBET, A. S. (1939b). A revision of the Malayan species of *Rapala* Moore. *Proc. R. ent. Soc. Lond.* (B), 8 : 103-112.
- (1939c). A revision of the Malayan species of *Allotinus* Felder & Felder. *Trans. R. ent. Soc. Lond.*, 89 : 63-77.
- (1940a). Observations on species of Lycaenidae from the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (B), 9 : 1-6.
- (1940b). A revision of the Malayan species of *Chliaria* Moore. *Proc. R. ent. Soc. Lond.* (B), 9 : 90-92.
- (1940c). A revision of the Malayan species of *Logania* Distant. *Proc. R. ent. Soc. Lond.* (B), 9 : 111-112.
- (1940d). A note on the *Celastrina quadriplaga*-complex. *Proc. R. ent. Soc. Lond.* (B), 9 : 143.
- (1940e). A revision of the Malayan species of *Tajuria* Moore. *Trans. R. ent. Soc. Lond.*, 90 : 107-120.
- (1940f). A revision of the Malayan species of Poritiinae. *Trans. R. ent. Soc. Lond.*, 90 : 337-350.
- (1940g). Revisional notes on Malayan Rhopalocera. *Entomologist*, 73 : 39-43.
- (1940h). The identity of the Fabrician species *Papilio sphinx* and *Papilio hylax*. *Entomologist*, 73 : 275-277.
- (1941a). The distribution of butterflies in the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (A), 16 : 101-116.
- (1941b). The Linnaean names of Indo-Australian Rhopalocera. Part 1. *Proc. R. ent. Soc. Lond.* (B), 10 : 8-16.
- (1941c). The Linnaean names of Indo-Australian Rhopalocera. Part 2. *Proc. R. ent. Soc. Lond.* (B), 10 : 17-27.
- (1941d). A revision of the Malayan species of *Horaga* Moore. *Proc. R. ent. Soc. Lond.* (B), 10 : 46-50.
- (1941e). Revisional notes on the genus *Catapaecilma* Butler. *Proc. R. ent. Soc. Lond.* (B), 10 : 81-84.
- (1941f). Observations on certain of the Fabrician names of Indo-Australian Rhopalocera. *Proc. R. ent. Soc. Lond.* (B), 10 : 98-106.
- (1941g). A key to the Indo-Malayan species of *Arhopala* Boisduval. *Proc. R. ent. Soc. Lond.* (B), 10 : 149-170.
- (1941h). A revision of the Malaysian genus *Tanaecia* Butler. *Ann. Mag. nat. Hist.* (xi), 7 : 507-520.
- (1942a). The Linnaean names of Indo-Australian Rhopalocera. Part 3. *Proc. R. ent. Soc. Lond.* (B), 11 : 91-94.
- (1942b). Revisional notes on the genus *Euploea* F. *Ann. Mag. nat. Hist.* (xi), 9 : 253-267.
- (1942c). *Spolia Mentawiensis* : Rhopalocera, Nymphalidae. *Ann. Mag. nat. Hist.* (xi), 9 : 615-626.
- (1942d). Miscellaneous notes on the butterflies of the Malay Archipelago. *Entomologist*, 75 : 172-174.
- (1942e). Fruit-baiting for Lepidoptera in the Eastern Tropics. *Entomologist*, 75 : 219-221.
- (1943a). A key for the separation of the Indo-Australian and African species of the genus *Euploea* F. *Proc. R. ent. Soc. Lond.* (B), 12 : 17-22.
- (1943b). The forms of *Elymnias hypermnestra* (L.) in the Malay Peninsula. *Proc. R. ent. Soc. Lond.* (B), 12 : 117-119.
- (1944). Some notes on the butterflies of the Langkawi Islands. *Entomologist*, 77 : 39-42.

- CORBET, A. S. (1945a). The Linnaean names of Indo-Australian Rhopalocera. Part 4. The Chinese butterflies in the Linnaean collection obtained by Peter Osbeck in 1751. *Proc. R. ent. Soc. Lond.* (B), 14 : 91-94.
- (1945b). Notes on the butterflies of north Kedah, Malaya. *Entomologist*, 78 : 137-141.
- (1945c). The species of the *aconthea* group of the genus *Euthalia* Hübner. *Entomologist*, 78 : 177-183.
- (1946a). Observations on the Indo-Australian species of the genus *Arhopala* Boisduval. *Trans. R. ent. Soc. Lond.*, 96 : 73-88.
- (1946b). The conspecificity of *Phrissura aegis* (C. & R. Felder) and *Udaana cymis* (Hew.). *Entomologist*, 79 : 145-146.
- (1947). Papers on Malaysian Rhopalocera. I : The forms of *Idrusia nyctelius* (Dbl., 1845) in the Malay Peninsula. *Entomologist*, 80 : 28-29.
- (1948a). Revisional notes on Oriental Lycaenidae. I : *Proc. R. ent. Soc. Lond.* (B), 17 : 93-97.
- (1948b). Revisional notes on Oriental Lycaenidae. II : *Proc. R. ent. Soc. Lond.* (B), 17 : 98-102.
- (1948c). Papers on Malaysian Rhopalocera. III. The butterflies of Singapore Island. *Entomologist*, 81 : 9-14.
- (1948d). Papers on Malaysian Rhopalocera. V. The conspecificity of the American *Precis lanua* (Cramer) with the Oriental *Precis orithya* (Linnaeus). *Entomologist*, 81 : 54-56.
- (1948e). Papers on Malaysian Rhopalocera. VI : *Symbrenthia hippocla* (Hübner, 1838), a species distinct from *S. hippoclus* (Cramer, 1779). *Entomologist*, 81 : 164-167.
- (1949a). Papers on Malaysian Rhopalocera. VII : The Skat Expedition to the Siamese Malay States in 1899-1900 and the faunal boundary in north Malaya. *Entomologist*, 82 : 8-15.
- (1949b). The Linnaean names of Indo-Australian Rhopalocera. Part 6. The case of *Papilio plexippus* Linnaeus, 1758. *Proc. R. ent. Soc. Lond.* (B), 18 : 184-190.
- (1949c). The Linnaean names of Indo-Australian Rhopalocera. Part 7. Summary of determinations. *Proc. R. ent. Soc. Lond.* (B), 18 : 191-199.
- (1949d). Observations on the species of Rhopalocera common to Madagascar and the Oriental Region. *Trans. R. ent. Soc. Lond.*, 99 : 589-607.
- CORBET, A. S. and H. M. PENDLEBURY (1932). A revision of the Indo-Australian species of the genus *Euxema* with special reference to the Malaysian forms. *Bull. Raffles Mus.*, 7 : 143-193.
- (1936). Revision of the genus *Amathusia* with special reference to the Malaysian species. *J. F. M. S. Mus.*, 18 : 141-153.
- (1938). Further notes on the genus *Amathusia*. *J. F. M. S. Mus.*, 18 : 240-241.
- CRÜGER, C. (1878). [No title.] *Ver. Ver. naturw. Unter., Hamburg*, 3 : 29.
- DAVIDSON, J., BELL, T. R. and AITKEN, E. H. (1896). The Butterflies of the North Canara District. *J. Bombay nat. Hist. Soc.*, 10 : 237.
- DISTANT, W. L. (1882-1886). Rhopalocera Malayana. Penang.
- DOWDESWELL, W. H., FISHER, R. A. and FORD, E. B. (1940). The quantitative study of populations in the Lepidoptera. I. *Polyommatus icarus* Rott. *Ann. Eugen. Camb.*, 10 : 123-136.
- DROHNEN, J. (1933). Über Art- und Rassenunterschiede der männlichen Kopulationsapparate von Pieriden. *Entom. Rdsch.*, 50, Beiheft : 1-135.

- DRUCE, H. H. (1904). Report on the Lycaenidae. *Fasciculi Malayenses, Zool.*, pt. 3 : 1-13.
- ELWES, H. J. (1891). On butterflies collected by Mr. W. Doherty in the Naga and Karen Hills and in Perak. Part I. *Proc. zool. Soc. Lond.*, 1891 : 249-289.
- (1892). On butterflies collected by Mr. W. Doherty in the Naga and Karen Hills and in Perak. Part II. *Proc. zool. Soc. Lond.*, 1892 : 617-664.
- EVANS, W. H. (1932). Identification of Indian butterflies. Second edition, revised. Madras.
- (1939). Some interesting Malayan HesperIIDae, and an analysis of the genus *Sepa*. *J. F. M. S. Mus.*, 18 : 395-405.
- (1941a). The *Callineura* group of the genus *Plastingia* Butler. *Ann. Mag. nat. Hist.* (xi), 8 : 66-71.
- (1941b). A revision of the genus *Erionota* Mabille. *Entomologist*, 74 : 158-160.
- (1943a). A revision of the genus *Suastus* Moore. *Proc. R. ent. Soc. Lond.* (B), 12 : 95-96.
- (1943b). A revision of the genus *Aeromachus* de N. *Proc. R. ent. Soc. Lond.* (B), 12 : 97-101.
- (1949). A catalogue of the HesperIIDae from Europe, Asia and Australia in the British Museum (Nat. Hist.). London.
- (1953). A note on the Indian species of the genus *Lycaenopsis* Felder (*Lep. Lycaenidae*). *J. Bombay N. H. Soc.* 51 (3) : 755.
- (1954). A revision of the genus *Curetis*. *Entomologist* 87 : 190-194, 212-216.
- FELDER, C. and R. (1860). Lepidoptera nova in paeninsula Malayica collecta diagnosibus instructa. *Wien. Ent. Mschr.*, 4 : 394-402.
- FISHER, R. A., CORBET, A. S. and WILLIAMS, C. B. (1943). The relation between the number of species and the number of individuals in a random sample of an animal population. *J. Anim. Ecol.*, 12 : 42-58.
- FORD, E. B. (1940). Mendelism and evolution. Third edition, revised. London.
- (1941). Studies in the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. I. The anthoxanthins. *Proc. R. ent. Soc. Lond.* (A), 16 : 65-90.
- (1942). Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. II. Red pigments in the genus *Delias* Hübner. *Proc. R. ent. Soc. Lond.* (A), 17 : 87-92.
- (1944a). Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. III. The red pigment of the Papilionidae. *Proc. R. ent. Soc. Lond.* (A), 19 : 92-106.
- (1944b). Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. IV. The classification of the Papilionidae. *Trans. R. ent. Soc. Lond.*, 94 : 201-223.
- (1945). Polymorphism. *Biol. Rev.*, 20 : 73-88.
- (1947). A murexide test for the recognition of pterins in intact insects. *Proc. R. ent. Soc. Lond.* (A), 22 : 72-76.
- FRACKER, S. B. (1915). The classification of lepidopterous larvae. *Illinois biol. Monogr.*, 2, No. 1. Second and revised edition, 1930.
- FRYER, J. C. F. (1913). An investigation by pedigree breeding into the polymorphism of *Papilio polytes* Linnaeus. *Philos. Trans.* (B), 204 : 227-254.
- GABRIEL, A. G. (1941). The superficial differences between *Troides cuneifera* Oberthür and *Troides amphrysus* Cramer. *Entomologist*, 74 : 203-204.
- (1943). A revision of the genus *Ixias* Hübner. *Proc. R. ent. Soc. Lond.* (B), 12 : 55-70.

- GUÉRIN-MÉNÉVILLE, F.-E. (1839). Description d'un Papillon nouveau découvert par M. Adolphe Delessert dans l'île de Pulo-Pinang. *Rev. Zool.*, 1839 : 234-235.
- (1840). Lépidoptères nouveaux découverts aux Indes-Orientales par M. Adolphe Delessert. *Rev. Zool.*, 1840 : 43-44.
- (1843). in A. DELESSERT, Souvenirs d'un Voyage dans l'Inde exécuté de 1834 à 1839 par M. Adolphe Delessert. Part II. Histoire Naturelle. Paris. Lépidoptères. Pp. 68-98.
- HEWITSON, W. C. (1862). Specimen of a catalogue of Lycaenidae in the British Museum. London.
- (1863-1878). Illustrations of diurnal Lepidoptera Lycaenidae. London.
- HINTON, H. E. (1946). On the homology and nomenclature of the setae of lepidopterous larvae, with some notes on the phylogeny of the Lepidoptera. *Trans. R. ent. Soc. Lond.*, 97 : 1-37.
- HONRATH, E. G. (1885). Neue Rhopalocera. III. *Berl. ent. Z.*, 29 : 272-273.
- (1887a). Neue Rhopalocera. VI. *Berl. ent. Z.*, 31 : 347-352.
- (1887b). Wenig bekannte Tagfalter. *Berl. ent. Z.*, 31 : 352.
- HOPKINS, F. G. (1895). The pigment of the Pieridae : a contribution to the study of excretory substances which function in ornament. *Philos. Trans. (B)*, 186 : 661-682.
- HORSFIELD, T. and MOORE, F. (1857). A catalogue of the lepidopterous insects in the Museum of the Hon. East-India Company. 1. London.
- HUXLEY, J. S. (1942). Evolution : the modern synthesis. London.
- IMMS, A. D. (1925). A general textbook of entomology. London.
- JACOBSON, E. (1909). Beobachtungen über den Polymorphismus von *Papilio memnon* L. *Tijdschr. Ent.*, 52 : 125-157.
- KERSHAW, J. C. (1905-7). The Butterflies of Hong Kong.
- KLOSS, C. B. (1929). The zoo-geographical boundaries between Asia and Australia and some Oriental Sub-regions. *Bull. Raffles Mus.*, 2 : 1-10.
- LE CERF, F. (1912). Migration d'une espèce du genre *Delias* Hübn. *Bull. Soc. ent. France*, 1912 : 348-349.
- L[EEUWEN], D. V[AN] (1924). Een Vlinderzwerm in de Straat van Malakka. *Trop. Natuur*, 13 : 182-186.
- MARTIN, L. (1909). Eine paläarkt. Pieride unter dem Aequator. *Ent. Z.*, 23 : 161-162.
- MAYR, E. (1942). Systematics and the origin of species from the viewpoint of a zoologist. New York.
- (1944). Wallace's Line in the light of recent zoogeographic studies. *Quart. Rev. Biol.*, 19 : 9, 1-14.
- MERRILL, E. D. (1945). Plant life of the Pacific world. New York.
- MORRELL, R. (1953). *Papilio memnon agenor* in Singapore: Some problems of mimicry. *Malayan Nature Journal* 8 : 109-115.
- (1954). Notes on larval habits of a group of Nymphalid butterflies. *Malayan Nature Journal* 8 : 157-164.
- VAN DER NOORDA, W. A. (1937). Dagvlinders in Midelen-Java. *Ent. Med. Ned.-Indië* 3 : 7-10.
- (1937a). Aanteekeningen over Javaansche Dagvlinders. *Ent. Med. Ned.-Indië* 3 : 64.
- MOULTON, J. C. (1921). Notes on Malaysian butterflies. Part I. (Danaiidae.) *J. F. M. S. Mus.*, 10 : 157-192.
- (1923). Some Pierine butterflies new to Malaysia. *J. Malay. Br. Asiat. Soc.*, 87 : 233-236.

- DE NICÉVILLE, L. and MARTIN, L. (1896). A list of the butterflies of Sumatra with especial reference to the species occurring in the north-east of the Island. *J. Asiat. Soc. Beng.*, 64, pt. 2 : 357-555.
- PENDLEBURY, H. M. (1923a). An expedition to some hills in Nakon Sri Tamarat, Peninsular Siam. *J. F. M. S. Mus.*, 11 : 1-20.
- (1923b). Notes on the Lepidoptera taken in Nakon Sri Tamarat, Peninsular Siam. *J. F. M. S. Mus.*, 11 : 21-48.
- (1927). Gunong Tahan. *Huxley Palmer's Annual*, 1927 : 11-19, 32.
- (1933). Notes and new records of butterflies from the Malay Peninsula. *J. F. M. S. Mus.*, 17 : 377-401.
- (1936). Some new records of butterflies from the Malay Peninsula. *J. F. M. S. Mus.*, 18 : 178-186.
- (1939). Notes on some new or little known Malaysian butterflies. *J. F. M. S. Mus.*, 18 : 380-394.
- PENDLEBURY, H. M. and CHASEN, F. N. (1932). A zoological expedition to Mt. Kinabalu, British North Borneo (1929). *J. F. M. S. Mus.*, 17 : 1-38.
- PENDLEBURY, H. M. and CORBET, A. S. (1933). Some Lycaenidae new to the Malay peninsula. *J. F. M. S. Mus.*, 17 : 402-405.
- (1938). The *tubentina*-group of the genus *Euthalia* Hbn. *J. F. M. S. Mus.*, 18 : 236-239.
- PLÖTZ, C. (1885). Neue Hesperiden des indischen Archipels und Ost-Africa's aus der Collection des Herrn . . . Künstler auf Malacca (Perak) . . . *Berl ent. Z.*, 29 : 225-232.
- POCK-STEEN, O. CH. (1940). Eenige bijzonderheden over *Papilio empedocles* op Java. *Trop. Natuur*, 29 : 54-56.
- (1940). De Ontwikkeling van *Papilio nephelus*. *Ent. Med. Ned.-Indie* 6: 56-58.
- POULTON, E. B. (1921). Butterflies (*Delias*, *Pierinae*) migrating in evening from one valley to another in Selangor, F.M.S., and back in morning accompanied by moth mimics (*Dysphania* (*Euschema*), *Geometrinae*), and these again by their moth mimics (*Psaphis* : *Chalcosiinae* : *Zygaenidae*). *Proc. ent. Soc. Lond.*, 1920 : lxiii-lxviii.
- (1922). Pierine butterflies and mimetic moths migrating from one valley to another in Selangor, F.M.S. *Proc. ent. Soc. Lond.*, 1921 : v-vi.
- VAN REGTEREN ALTENA, C. O. (1944). Over orientale soorten van het genus *Tagiades* Hübner, in het bijzonder over de Javaansche. *Ent. Ber. Amst.*, 11 : 168-171.
- RIDLEY, H. N. (1922-1925). The flora of the Malay Peninsula. 5 vols. Ashford, Kent.
- RILEY, N. D. (1922). The genus *Amblypodia* auctorum (de Nicéville, Moore, Swinhoe, etc.), nec Horsfield. *Entomologist*, 55 : 25-29, 51-53.
- (1929). Revisional notes on the genus *Heliophorus* with descriptions of new forms. *J. Bombay nat. Hist. Soc.*, 33 : 384-402.
- (1942). New Lycaenidae from the Malay Peninsula. *Entomologist*, 75 : 88-89.
- (1945). *Spolia Mentawiensia* : Rhopalocera, Lycaenidae and Riodinidae. *Trans. R. ent. Soc. Lond.*, 94 : 247-271.
- RILEY, N. D. and CORBET, A. S. (1938). A revision of the Malayan species of *Jamides* Hübner. *Trans. R. ent. Soc. Lond.*, 87 : 147-159.
- ROEPKE, W. (1935-1942). Rhopalocera Javanica. Wageningen. (1935, I. Fam. Papilionidae en Pieridae ; 1936, II. Fam. Danaidae, Satyridae en Ama-thuidae ; 1938, III. Fam. Nymphalidae ; 1942, IV. Fam. Libytheidae & Lemoniidae en Aanvullingen en Verbeteringen op de dee II-III.)

- ROEPKE, W. (1938). On the present status of *Vindula* (*Cynthia* Auct.) *erota* (Fab.) and *V. arsinoid* (Cr.). *Proc. R. ent. Soc. Lond.* (B), 7 : 85-87.
- ROSIER, J. P. (1940). Aanteekeningen over ontwikkelingsstadia van eenige javaansche vlinders. *Ent. Med. Ned.-Indië*, 6 : 61-64.
- (1941). De ontwikkeling van eenige javaansche dagvlinders. *Ent. Med. Ned.-Indië*, 7 : 18-24.
- (1947). De ontwikkeling van eenige javaansche dagvlinders. *Ent. Med. Ned.-Indië*, 7 : 66-68.
- ROTHSCHILD, W. (1895). A revision of the *Papilio*s of the Eastern Hemisphere, exclusive of Africa. *Nouv. zool.*, 2 : 167-463.
- SCHATZ, E. (1885-1892). In O. STAUDINGER and F. SCHATZ, Exotische Schmetterlinge, 2. Die Familien und Gattungen der Tagfalter. Fürth, Bavaria.
- SEITZ, A. (1908-1928). Macrolepidoptera of the world, 9. Stuttgart. (Papilionidae by K. JORDAN, Pieridae to end of Lycaeninae by H. Fruhstorfer, Theclinae, Poritinae and Hesperidae by A. Seitz.)
- (1934). Funf entomologische Tage. Der fünfte Tag : Singapore. *Ent. Rdsch.*, 51 : 157-170.
- STEWART, C. D. (1930) The rainfall of Malaya. *Malay. agric. J.*, 18 : 530-540.
- TALBOT, G. (1928-1937). A monograph of the Pierine genus *Delias*. London.
- (1939). Fauna of British India, including Ceylon and Burma. Butterflies, 1. London. (Families Papilionidae and Pieridae.)
- (1939a). *Danaus aventina* (Cram.) and *D. vulgaris* (Butl.). *Entomologist*, 72 : 288-291.
- (1940). Revisional notes on the genus *Ideopsis* Moore. *Proc. R. ent. Soc. Lond.* (B), 9 : 197-202.
- (1941). Revisional notes on the genus *Idea* Fabr. *Trans. R. ent. Soc. Lond.*, 91 : 105-117.
- (1942). The races and forms of *Mahathala ameria* (Hewitson). *Proc. R. ent. Soc. Lond.* (B), 11 : 120-123.
- (1943a). Notes on the genus *Euploea* F. *Proc. R. ent. Soc. Lond.* (B), 12 : 6-16.
- (1943b). The *lubentina* group of the genus *Euthalia* Hübner. *Proc. R. ent. Soc. Lond.* (B), 12 : 37-41.
- (1943c). Revisional notes on the genus *Danaus* Kluk. *Trans. R. ent. Soc. Lond.*, 93 : 115-148.
- TALBOT, G. and A. S. CORBET (1939). The Indo-Malayan species of the mineus-group of *Mycalis* Hbn. *J. F. M. S. Mus.*, 18 : 406-414.
- (1943). The species of the *corytus* group of the genus *Euthalia* Hbn. *Entomologist*, 76 : 7-10.
- TILLYARD, R. J. (1926). The insects of Australia and New Zealand. Sydney.
- TOXOPEUS, L. J. (1927a). Eine Revision der javanischen, zu *Lycaenopsis* Felder und verwandten Genera gehörigen Arten. *Lycaenidae Australasiae*. II. *Tijdschr. Ent.*, 70 : 232-302.
- (1927b). *Lycaenidae Australasiae*. III. On *Nacaduba kurava* Moore, and other species of *Nacaduba*. *Treubia*, 9 : 423-436.
- (1928). Eine Revision der javanischen, zu *Lycaenopsis* Felder verwandten Genera gehörigen Arten. *Lycaenidae Australasiae*. II. *Tijdschr. Ent.*, 71 : 179-265.
- (1929). *Lycaenidae Australasiae*. VI. De Riodinidae en *Lycaenidae* van het eiland Java. *Tijdschr. Ent.*, 72 : 215-244.
- (1930). De Soort als Functie van Plaats en Tijd getoetst aan de *Lycaenidae* van het Australaziatisch Gebied. Amsterdam.

- TOXOPEUS, L. J. (1935a). Over eenige nieuwe en weinig bekende Lycaenidae van Java. *Ent. Med. Ned.-Indië*, 1 : 10-13.
- (1935b). Over *Ruralis absolon* (Hew.). *Ent. Med. Ned.-Indië*, 1 : 33-36.
- (1935c). Over twee Lycaenidae : *Celastrina lavendularis* (Moore) en *C. placidula* (H. H. Druce). *Ent. Med. Ned.-Indië*, 1 : 68-72.
- (1936a). Über seltene malayische Schmetterlinge (1 Teil). *Ent. Med. Ned.-Indië*, 2 : 46-48.
- (1936b). Über seltene malayische Schmetterlinge (forts.). *Ent. Med. Ned.-Indië*, 2 : 53-58.
- (1937). *Papilio empedocles* op Java. *Ent. Med. Ned.-Indië*, 3 : 19-21.
- TOXOPEUS, L. J. and POCK-STEEN, O. CH. (1947). Nieuwe of weinig bekende Lepidoptera van Java. *Ent. Med. Ned.-Indië*, 7 : 42-43.
- TWEEDIE, M. W. F. (1949). A rare form of *Papilio memnon* from Singapore. *Malayan Nature Journal* 4 : 210.
- WALLACE, A. R. (1855). The entomology of Malacca. *Zoologist*, 13 : 4636-4639.
- (1865). On the phenomena of variation and geographical distribution as illustrated by the Papilionidae of the Malayan Region. *Trans. Linn. Soc. Lond.*, 25 : 1-71.
- (1867). On the Pieridae of the Indian and Australian Regions. *Trans. ent. Soc. Lond.* (iii), 4 : 301-415.
- (1869). The Malay Archipelago. London.
- WATSON, J. G. (1928). Malayan plant names. *Malay. For. Rec.*, 5.
- WHEELER, L. R. (1940). On the alleged rarity of certain *Papilio* females in Malaya. *Entomologist*, 73 : 269-274.
- (1942). Butterflies of Penang Island. *Ent. Rec.*, 54 : 39-41, 53-57.
- (1943). On the conspecificity of *Gatopsilia crocale* Cramer and *C. pomona* Fabricius. *Entomologist*, 76 : 89-94.
- WILDEY, A. W. G. (1941). The Eggfly (*Hypolimnas bolina incommoda* Btlr.). *Malaya Nature J.*, 1 : 147-148.
- WILLIAMS, C. B. (1930). The migration of butterflies. Edinburgh and London.
- (1944). Some applications of the logarithmic series and the index of diversity to ecological problems. *J. Ecol.*, 32 : 1-44.
- (1947). The logarithmic series and its application to biological problems. *J. Ecol.*, 34 : 253-272.
- ZEUNER, F. E. (1941). Geology, climate and faunal distribution in the Malay Archipelago. *Proc. R. ent. Soc. Lond.* (A), 16 : 117-123.
- (1943a). Studies in the systematics of *Troides* Hübner and its allies ; Distribution and phylogeny in relation to the geological history of the Australasian Archipelago. *Trans. zool. Soc. Lond.*, 25 : 107-184.
- (1943b). On the venation and tracheation of the lepidopterous forewing. *Ann. Mag. nat. Hist.* (xi), 10 : 289-304.

APPENDIX

- p. 15 Other useful botanical works are: M. R. Henderson's *Malayan Wild Flowers* (Singapore, 1954), E. H. Corner's *Wayside Trees of Malaya* (Singapore, 1940) and J. H. Burkill's *Dictionary of Economic Products of the Malay Peninsula* (1935).
- p. 85 Merthiolate, which is primarily a fungicide, has recently been found very useful for preserving butterflies, free from mould, and and in a relaxed condition, in papers. It does not seem to affect colours so long as the specimen is not actually wetted with the solution.
- p. 103 *Papilio nephelus*. Egg, larva and pupa have been described in some detail (Pock-Steen, 1940). The food-plant in Java is *Fagara rhetsa* Roxb. (Rutaceae).
- p. 105 *Papilio memnon*. The rare tailless ♀-f *agenor*, in which the outer half of the hindwing (or more) is white, has been taken with some regularity in Singapore since 1948 (Tweedie, 1949; Morrell, 1953), after an interval of seventy years.
- p. 120 *Prioneris philonome*. The larva (found on *Capparis* in Java) (van der Noordaa, 1936) is described as watery green with smooth white spots on the sides of the segments, finely hairy, the head light green and the legs light yellow. Pupa is also described.
- p. 122 *Cepora iudith*. The larva (in Java, on *Capparis*) is described (van der Noordaa, 1937) as very like that of *Appias lyncida*; slender, rather dark grass-green, mixed with brownish; underside whitish. Pupa also described.
- p. 125 *Appias libythea* (Fabricius). By 1952 *A. libythea* was well established in the Peninsula, having been found in numbers near Kuala Lumpur and as far north at Taiping. By 1953 it was common in Penang and Province Wellesley.
- p. 180 *Tenaris horsfieldi*. The larva has been found in Java on *Smilax*. It is described (Rosier, 1940) as wine red, bearing fine long white hairs and with a pair of small upright shining black horns on the shining black head; last abdominal segment also black.
- p. 197 It has now been found that both *Vindula erota* and *V. arsinoe* occur in Celebes. The distribution line of *V. erota* in fig. 58 should therefore be carried to the east of Celebes, no longer following Wallace's Line (p. 26).

- p. 201 *Terinos clarissa*. In Java (Rosier, 1941) the larva has been found on *Rinorea gaultheriifolia* J.J.S. (Violaceae); egg, larva and pupa are described by Rosier.
- p. 207 A fresh specimen of *Vanessa cardui* was seen by Major Cowan at Kedah Peak Rest House, 3,000 ft. on 19.vi.53.
- p. 220 *Neptis hordonia*. There is strong presumptive evidence here that two species are confused under this name. Morrell (1954) adduces further evidence in support of this view.
Neptis nata. The larva (Morrell, 1954) feeds on various species of *Gironniera* (Ulmaceae). It has spiny processes on second and third thoracic segments and on the penultimate, but not the second, abdominal segment.
- p. 238 *Euthalia dirtea*. In Java (Rosier, 1940) the larva was found feeding on *Garcinia lateriflora* Bl. (Guttiferae). When full grown it was of the usual *Euthalia* form, rather bluish green, with two pale curved lines dorsally on each segment, the lateral feathery appendages yellowish green.
- p. 260 *Poritia erycinoides*. Rosier (1951) describes the larvae as living gregariously, feeding simultaneously, and moving in single file, on *Castanea argentea* in Java. Predominant colour grey, a dark median and a paler lateral line, a yellow, white-edged thoracic shield on first segment, the anal segment dirty yellow; broad, rather "square" in shape, tapering very little at either end; a rather thick covering of short white hairs arranged in stellate bundles. This appears to be the first description of any *Poritiina* larva.
- p. 288 *Zizeeria knysna karsandra* (Moore). Found in 1952 in a well-established colony around Sungei Gedong beyond Tengah in rural N.W. Singapore by Major C. F. Cowan, R.A. In 1953 it was again found throughout Perlis.
- p. 295 *Jamides*. The following key has been prepared by Lt.-Col. J. N. Eliot:—

Key for the separation of the *alpis* group of *JAMIDES*

- 1 (2) On the underside of the hindwing the second white stripe from the base in space 7 is in line with the third stripe from the base in the cell, or at least much nearer to this stripe than to the second cell stripe. Basal stripe in space 7 usually in line with the second cell stripe. Upperside shining blue, deeper than in other species of the group. Forewing black border expands almost to mid-costa, as usual. *J. caerulea*
- 2 The basal pair of stripes in space 7 more nearly in line with the basal pair of cell stripes.
- 3 (10) On the underside of the hindwing the second stripe from the base in space 7 is usually about midway between the second and third cell-stripes. The basal stripe in space 7 between the basal cell pair.
- 4 (7) On the upperside of the forewing the black border extends along the costa to the base.
- 5 (6) Upperside rather powdery but slightly shining greyish blue. The forewing dark border reaches the subcostal vein and often extends into the cell. Disc of hindwing dark-dusted. On the underside of the hindwing there is often a tendency for the stripes to approach the arrangement found in *caerulea*. *J. abdul*
- 6 Upperside rather matt pale blue. The forewing dark border does not reach the subcostal vein and the disc of the hindwing is not dark-dusted. *J. electo*
- 7 The forewing black border does not quite reach to mid-costa.

- 8 (9) Usually larger. Upperside pale blue, very slightly shining. The submarginal spot in space 2 of the hindwing is prominent and more or less round, and the lunule inwardly bordering it is often obscurely orange-dusted. Underside of forewing never with white costal dashes above the basal pair of stripes. *J. elpis*
- 9 Usually smaller. Upperside alkyl pale blue, slightly deeper than *elpis*. The submarginal spot in space 2 of the hindwing is semi-circular or oval, with the long axis parallel to the termen, and the lunule inwardly bordering it is never orange-dusted. Underside of forewing usually with costal dashes. *J. talanga*
- 10 On the underside of the hindwing the basal pairs of stripes in space 7 and the cell are continuous, or very nearly so.
- 11 (12) Underside of the forewing usually with costal dashes as in *talanga*. On the hindwing the orange tornal area is particularly large and more or less obliterates the post-discal lunule in space 2, and often that in space 3 also (note in Kedah the tornal orange area is more restricted than in Malaya proper). On the upperside the forewing black border is rather diffuse and usually expands abruptly just above vein 4. The hindwing submarginal spots are rather small, faint and diffuse on a bluish ground, that in space 2 being more or less circular. *J. sumida*
- 12 Underside of the forewing never with costal dashes. On the hindwing the tornal orange area does not invade the post-discal lunule in space 2. On the upperside the forewing black border is more regular. The hindwing submarginal spots, though small, are well-defined on a whitish ground that in space 2 being rather linear. *J. ferrari*

p. 299 *Nacaduba*. The following note and revised key to the *pavana* group
-301 of the genus *Nacaduba* has been very kindly prepared by Lt.-Col.
J. N. Eliot.

It has been found that the butterfly dealt with by Corbet as *Nacaduba lysa intricata* Corbet comprises two species which must be known as *N. subperusia lysa* Fruhstorfer (syn. *intricata* Corbet) and *N. sanaya elioti* Corbet. The female described by Corbet as pertaining to *lysa* is the female of *sanaya*, whilst Corbet confused the female of *subperusia* with females of *N. hermus* and *N. pavana*.

The key for the *pavana* group on pp. 299-300 should be modified as follows after subhead 3:—

- 4 (5) On the underside the interspaces of the paired discal strigae filled in by two rather narrow lines darker than the ground colour with between them a much broader line lighter than the ground colour. Upperside ♂ pale greyish blue, ♀ dark brown with a wedge-shaped shining pale blue discal patch on the forewing and hindwing blue-dusted towards the base. *N. pavana* (11.0-12.0 mm.)
- 5 On the underside the interspaces of the paired discal strigae concolorous with the ground colour.
- 6 (7) Underside markings very broad, diffuse and yellowish. *N. pactolus* (14.5-16.0 mm.)
- 7 Underside markings narrow as usual, consisting of separate lunules, narrow and distinct in ♂, and may be broader in ♀.
- 8 (11) On the underside of the hindwing the distance between the inner submarginal and the outer post-discal strigae in spaces 4 and 5 not wider than half the distance between the inner and outer post-discal strigae. Strigae pale buff in ♂, whitish in ♀.
- 9 (10) Upperside of ♂ violet blue with a slightly frosted appearance, forewing black border a thread. Upperside of ♀ pale shining blue with a slight purple tinge; forewing black border not increasing markedly towards the tornus, whilst on the hindwing the blue colour covers more than half the wing. *N. hermus* (13.0-15.0 mm.)
- 10 Upperside of ♂ matt deep bluish purple; forewing black border a thread. Upperside of ♀ blue of a slightly deeper shade than *hermus*; forewing black border increases markedly towards tornus, whilst on the hindwing the blue colour covers less than half the wing. *N. subperusia* (11.0-15.0 mm.)
- 11 On the underside of the hindwing the distance between the inner submarginal and the outer post-discal strigae in spaces 4 and 5 wider than half the distance between the outer and inner post-discal strigae. Strigae whitish to white in ♂, white in ♀.
- 12 (13) ♂ upperside purplish blue; black border on forewing increasing appreciably towards the apex (about 1.0-2.0 mm.). ♀ upperside purplish blue of almost the same shade as the ♂, the costal and distal black borders on the forewing uniformly narrow (about 2.0-3.0 mm.). *N. aaga* (14.0-16.0 mm.)

- 13 ♂ upperude clear shining bluish purple, with the strigae below showing through by transparency, forewing black border a thread ♀ upperude pale shining silvery blue with a slight greenish tinge, forewing black border not usually increasing towards the tornus.
N. sanaya (13 0-14 0 mm)

The key on pp. 299-300 can be adapted to include this alteration by altering (12), in the first line, to (14); deleting the existing matter from 4 (11) to end of 11, and replacing it by the new matter above; adding 2 to existing 12 and all subsequent numbers.

- p. 325 *Arhopala alitaeus*. An examination of more material, which was not available to Dr. Corbet, suggests that his subspecies *valika* and *pardeas* are only doubtfully tenable, and that both are probably inseparable from the subspecies *mirabella* of Burma.
- p. 335 *Drina cowani*. M. W. F. Tweedie has since the war taken both sexes in dense jungle near Nee Soon, Singapore.
- p. 433. The following names of Malayan butterflies have been placed by the International Commission on Zoological Nomenclature on the *Official Lists of Names in Zoology* and are therefore not subject to change. The number of the relevant *Opinion* is also given.

(i) Generic names	Gender	Number in List	Opinion No.
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<i>Papilio</i> Linn., 1758 ..	masculine	703	278
<i>Pieris</i> Schrank, 1801 ..	feminine	704	278
<i>Danaus</i> Kluk, 1802 ..	masculine	699	278
<i>Euploea</i> Fab., 1807 ..	feminine	611	163
<i>Vanessa</i> Fab., 1807 ..	feminine	601	156
<i>Neptis</i> Fab., 1807 ..	feminine	662	232
<i>Limenitis</i> Fab., 1807 ..	feminine	701	278
<i>Euthalia</i> Hub., 1819 ..	feminine	613	167
<i>Apatura</i> Fab., 1807 ..	feminine	657	232

(ii) Specific Names

<i>Atrophaneura aristolochiae</i> (Fab., 1775) ..	81	265
<i>Danaus plexippus</i> (Linn., 1758)	111	282

The N. American species. The correct name of the oriental species is *genutia* as used in this book.

<i>Euploea (phaenareta) corus</i> (Fab., 1793) ..	44	232
<i>corus</i> being the Cingalese race of <i>phaenareta</i> (Schall., 1785), described from Amboina.		
<i>Vanessa cardui</i> (Linn, 1758)	259	156
<i>Euthalia lubentina</i> (Cr., 1777)	187	167

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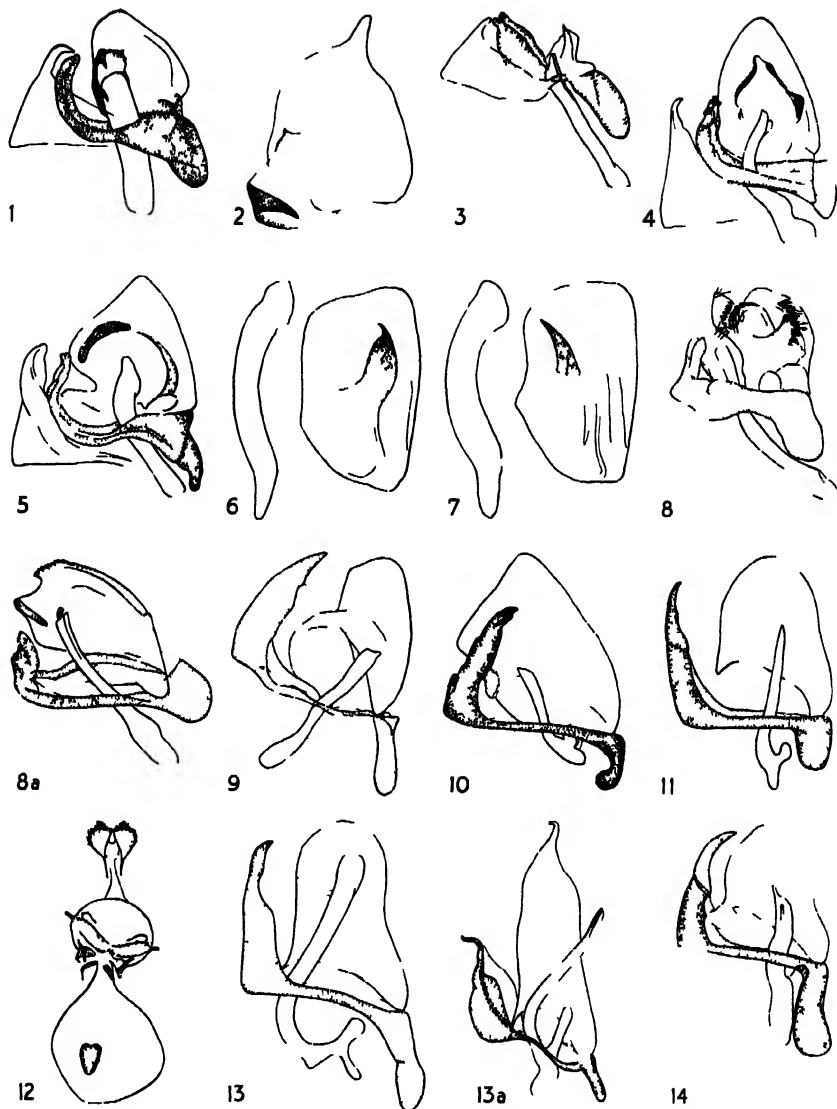
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**PLATES FIGURING GENITALIA OF
MALAYAN BUTTERFLIES**

NOTE

In the figures the left-hand valva has been removed to show clearly any internal features on the remaining valva. The male genitalia are shown unless stated otherwise.

PLATE 2

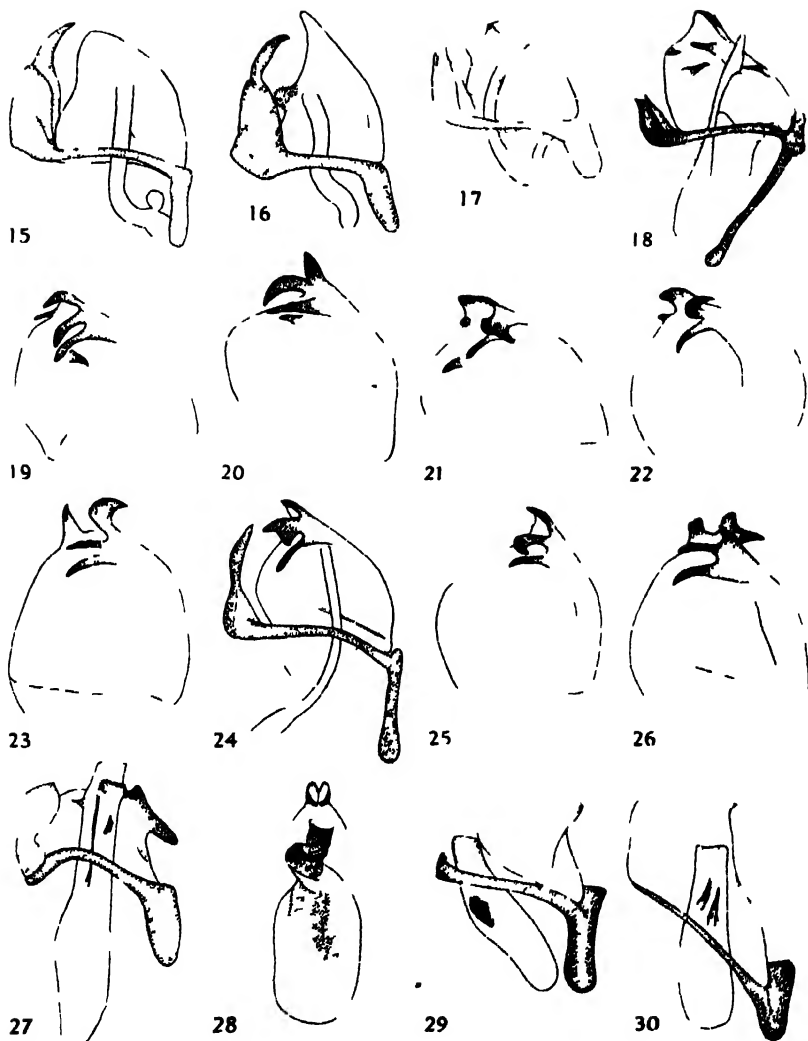


GENITALIA OF PAPILIONIDAE

- | | | | |
|---|-----------------------------------|----|--|
| 1 | <i>Troides cuneifera</i> | 6 | <i>P. helemus</i> (aedeagus and right valva) |
| 2 | <i>T. amphrysus</i> (right valva) | 7 | <i>P. ussurioides</i> (aedeagus and right valva) |
| 3 | <i>Atrophaneura aristolochiae</i> | 8 | <i>Graphium aristeus</i> |
| 4 | <i>Chlosa clytia</i> | 8a | <i>G. sarpedon</i> |
| 5 | <i>Papilio demoleus</i> | | |

GENITALIA OF PIERIDAE

- | | | | |
|----|--------------------------|-----|-------------------------|
| 9 | <i>Leptotes nina</i> | 13 | <i>Appas albina</i> |
| 10 | <i>Delias aglaja</i> | 13a | <i>Saletara liberna</i> |
| 11 | <i>Pieris napi</i> | 14 | <i>Phrissura aegus</i> |
| 12 | <i>P. rapae</i> (female) | | |



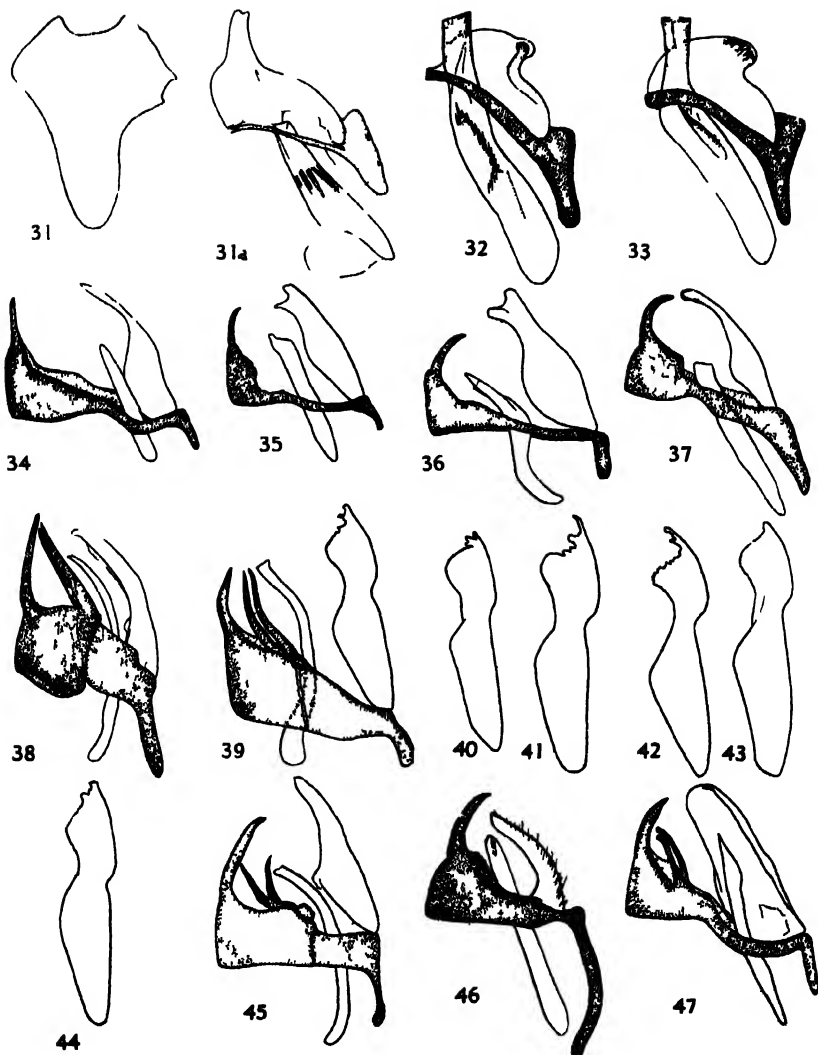
GENITALIA OF PIERIDAE (continued)

- | | | | |
|----|------------------------------------|----|-----------------------------------|
| 15 | <i>Ixias pyrene</i> | 21 | <i>E. blanda</i> (right valva) |
| 16 | <i>Valeria valeria</i> | 22 | <i>E. andersoni</i> (right valva) |
| 17 | <i>Catopsilia pomona</i> | 23 | <i>E. lacteola</i> (right valva) |
| 18 | <i>Eurema brigitta</i> | 24 | <i>E. ada</i> |
| 19 | <i>E. hecabe</i> (right valva) | 25 | <i>E. tarsi</i> (right valva) |
| 20 | <i>E. simulatrix</i> (right valva) | 26 | <i>E. tilaha</i> (right valva) |

GENITALIA OF DANAIDAE

- | | | | |
|----|-------------------------------|----|----------------------|
| 27 | <i>Danaus chrysippus</i> | 29 | <i>D. vulgaris</i> |
| 28 | <i>D. chrysippus</i> (female) | 30 | <i>Idaia lycerus</i> |

PLATE 4



GENITALIA OF DANAIIDAE (continued)

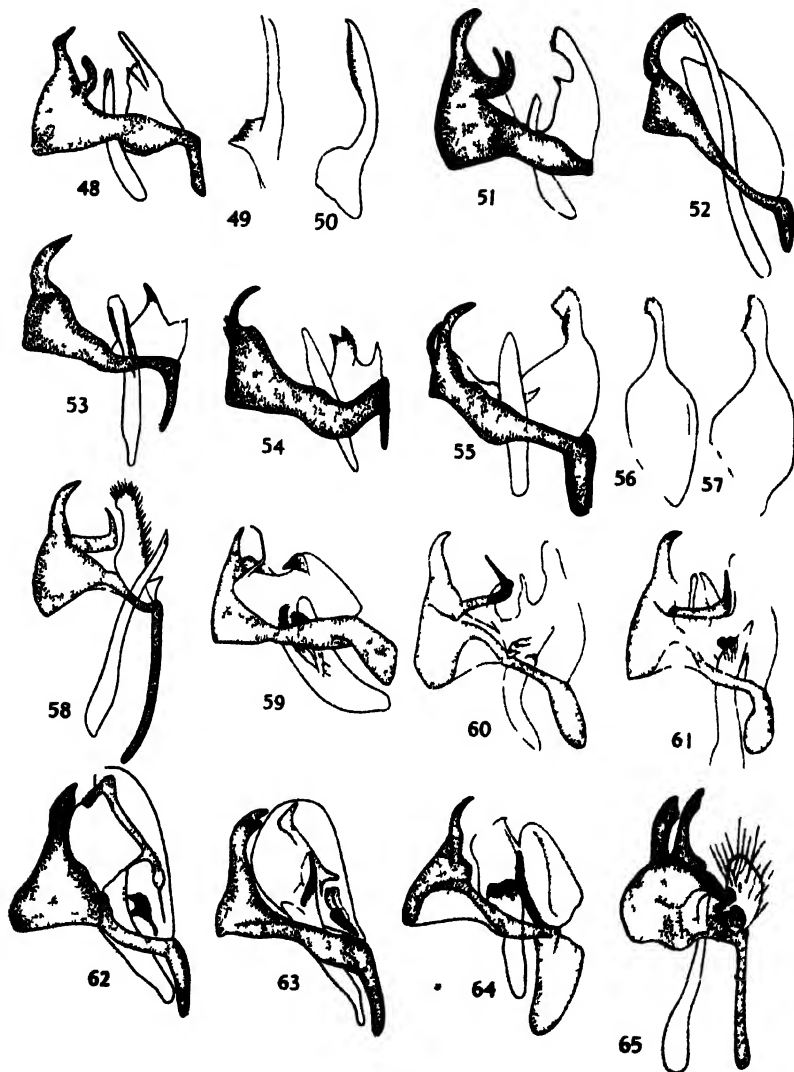
31 *Idea jasonia*
31a *I. leuconoe*

32 *Euploea midamus*
33 *E. klyti*

GENITALIA OF SATYRIDAE

34 *Ypthima ceylonica*
35 *Y. philomela*
36 *Y. baldus*
37 *Leitha europa*
38 *Mycalasis anapita*
39 *M. visala*
40 *M. persus* (right valva)

41 *M. persoides* (right valva)
42 *M. minus* (right valva)
43 *M. intermedia* (right valva)
44 *M. korymbosus* (right valva)
45 *M. oris*
46 *Melanitis leda*
47 *Elymnias hypermnestra*



GENITALIA OF AMATHUSIIDAE

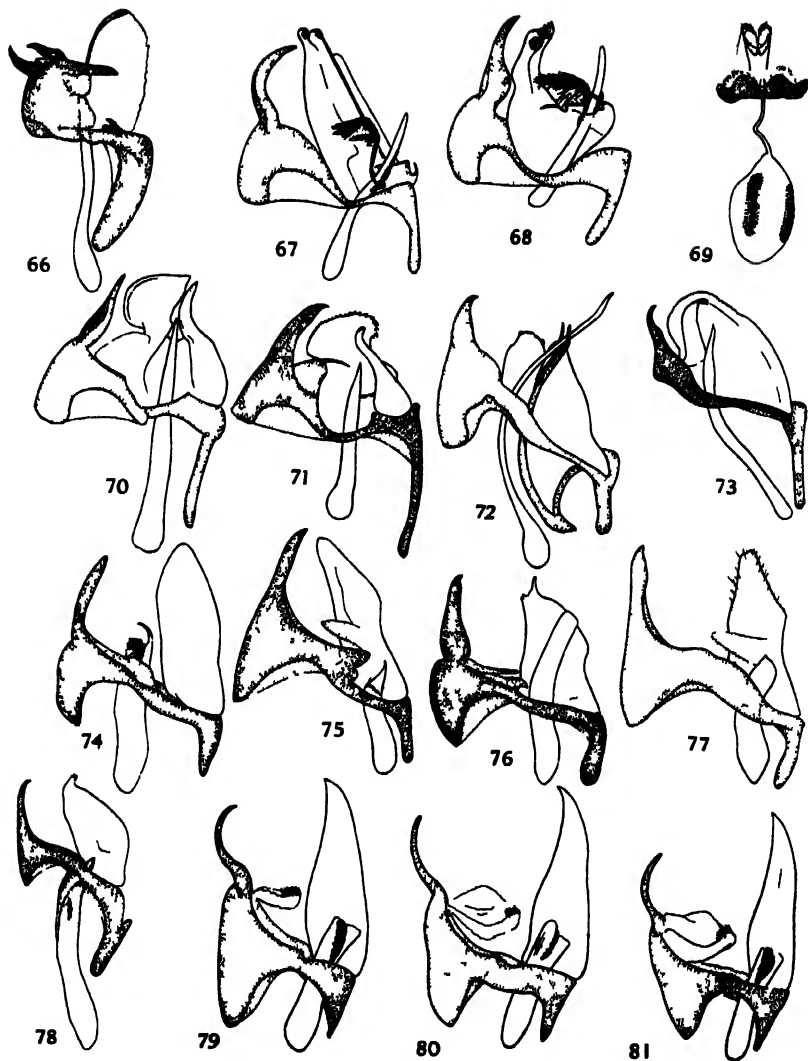
- 48 *Femis gracilis*
49 *F. canus* (right valva)
50 *F. fovea* (right valva)
51 *Tenaris longipalpis*
52 *Amathusa phaeopus*

- 53 *Zenaidia doubleclausi*
54 *Thamira albis*
55 *Ducophora tumora*
56 *D. sandaca* (right valva)
57 *D. nucha* (right valva)

GENITALIA OF NYMPHALIDAE

- 58 *Ariades ariades*
59 *Phalaena phalaenopsis*
60 *Vindula orate*
61 *V. orate*

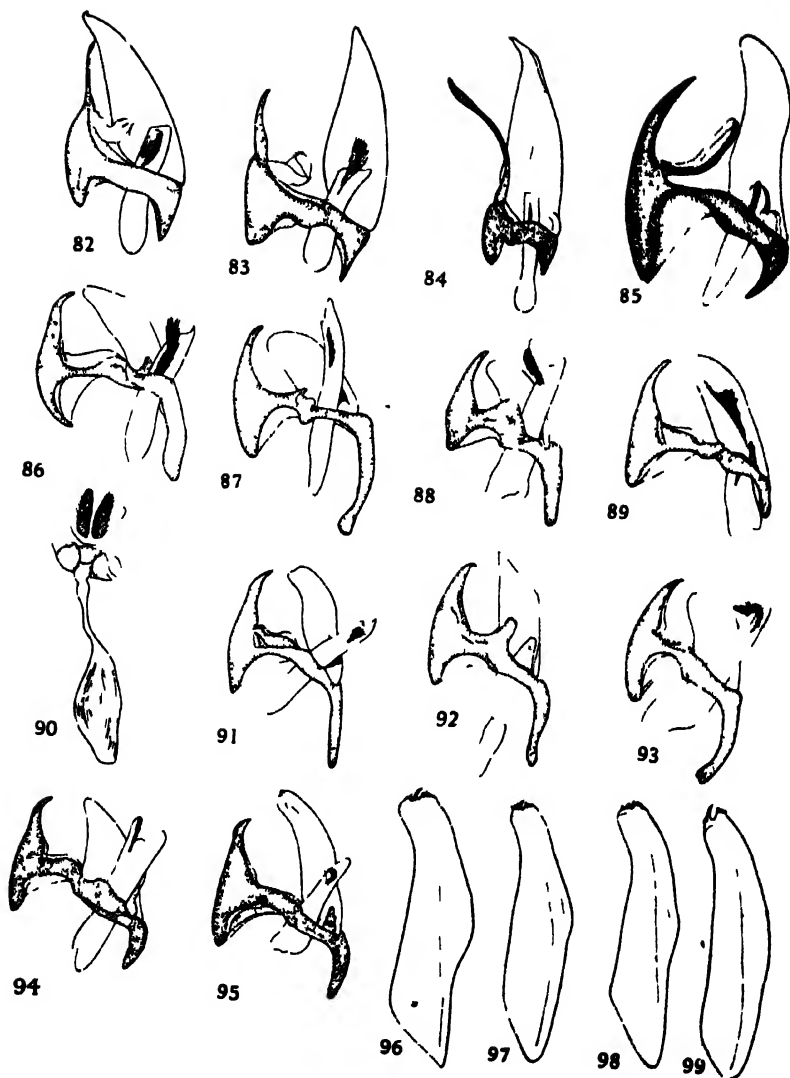
- 62 *Cirrochroa aerys*
63 *C. amala*
64 *Tarucus terpendar*
65 *Colotis biblis*



GENITALIA OF NYMPHALIDAE (continued)

- 66 *Cirrochroa penthesilea*
 67 *Procris leonamas*
 68 *P. orithya*
 69 *Vanessa cardui* (female)
 70 *Hypolimnias mirippus*
 71 *H. bolina*
 72 *Kallima paralekta*
 73 *Cyrestes coeles*

- 74 *Neptis halimodora*
 75 *Paralymna nufis*
 76 *Moduza procris*
 77 *Pandita sinope*
 78 *Lobadaea martha*
 79 *Tanacra palea*
 80 *T. palguma*
 81 *T. coelebs*



GENITALIA OF NYMPHALIDAE (continued)

82 *Tanacra clathrata*

83 *T. munda*

84 *T. arana*

85 *Euthalia iapis*

86 *E. monina*

87 *E. acantha*

88 *E. alphinda*

89 *E. mahadeva*

90 *E. mahadeva* (female)

91 *E. kanda*

92 *E. phemius*

93 *E. agnis*

94 *E. anesia*

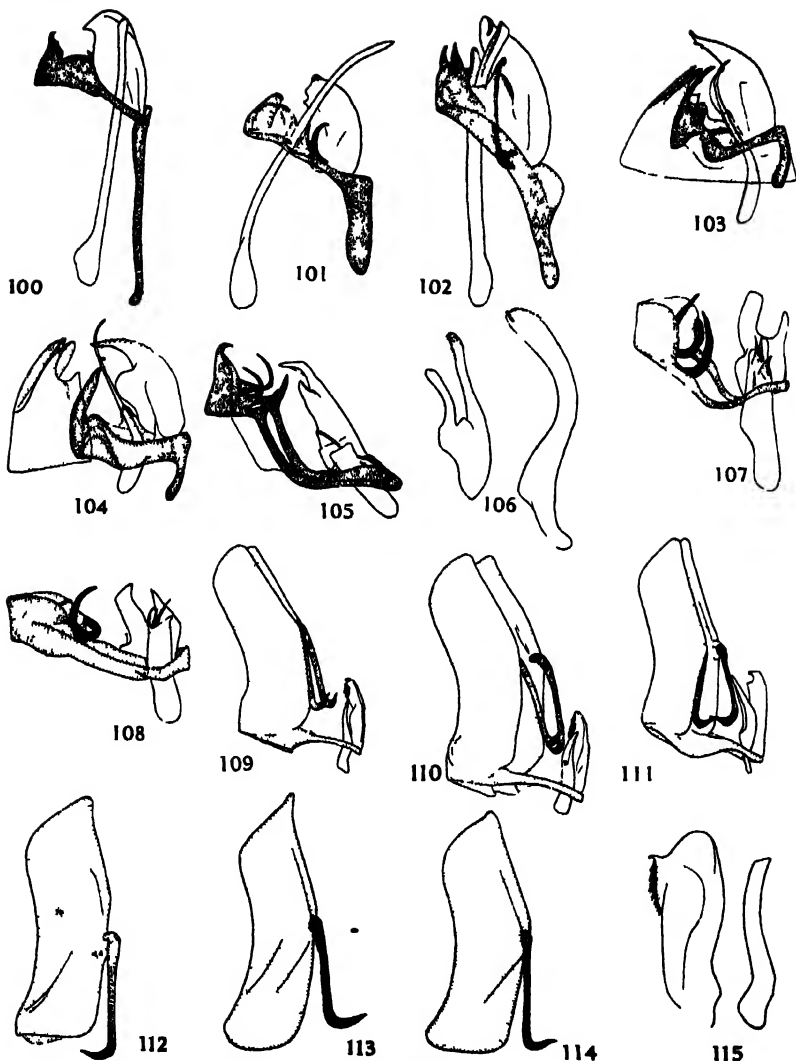
95 *E. lubentina*

96 *E. djata* (right valva)

97 *E. lubentina* (right valva)

98 *E. adonis* (right valva)

99 *E. whiteheadi* (right valva)



GENITALIA OF NYMPHALIDAE (continued)

- 100 *Idrusia nycetelus*
 101 *Polyura althamas*
 102 *Charaxes polyxena*
 105 *Abisara kausambi*

- 103 *Lythea narina*
 104 *L. myrrha*

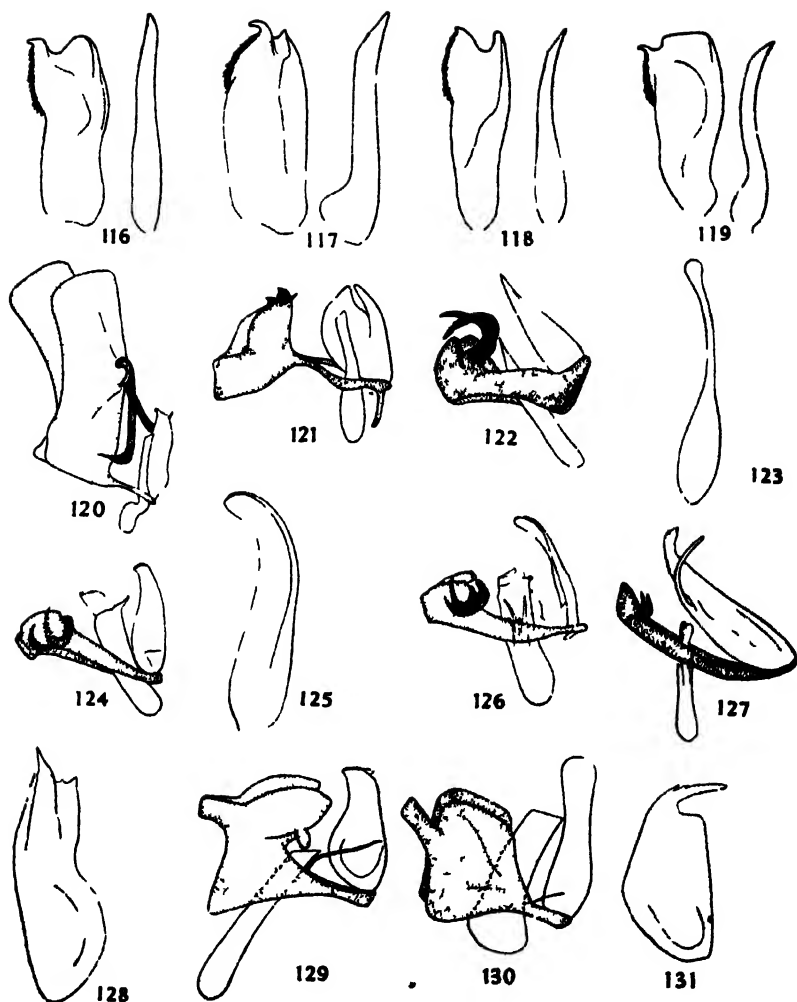
GENITALIA OF RIODINIDAE

- 106 *A. saturata kausambioides* (right valva and aedagus)

GENITALIA OF LYCAENIDAE

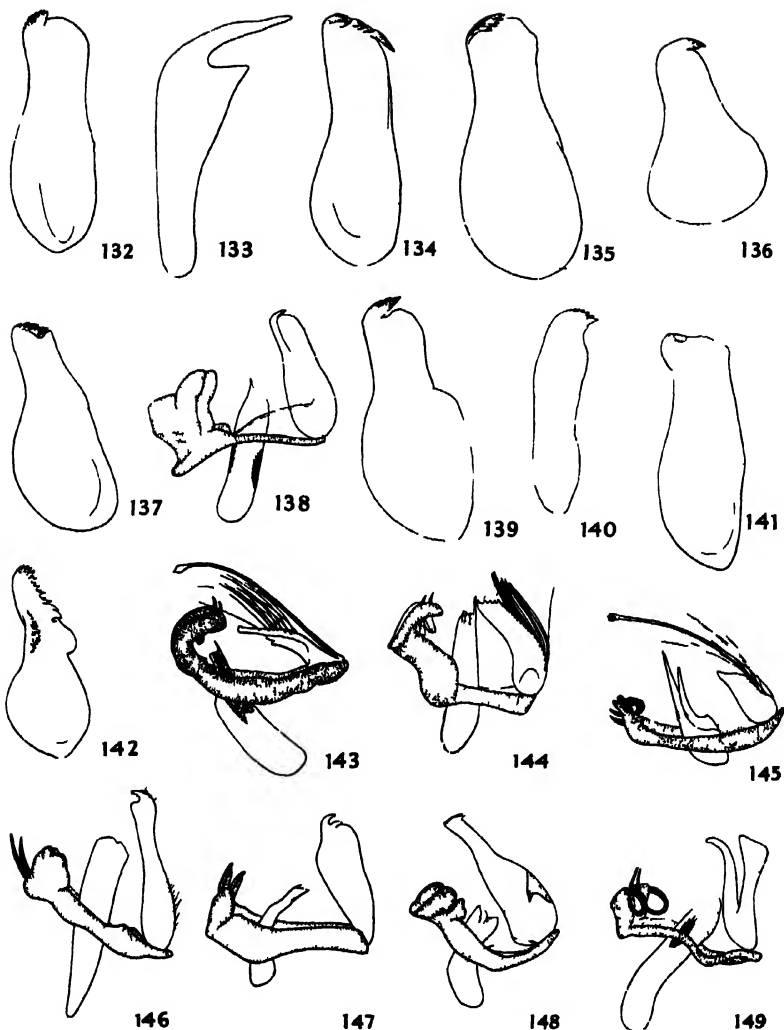
- 107 *Poritia sumatras*
 108 *Smistana padada*
 109 *Miletus boischuvali*
 110 *M. ancon*
 111 *Allotinus unicolor*

- 112 *A. horghfeldi* (uncus plate)
 113 *A. horghfeldi* (uncus plate)
 114 *A. horghfeldi* (uncus plate)
 115 *A. fabius* (right valva and aedagus)



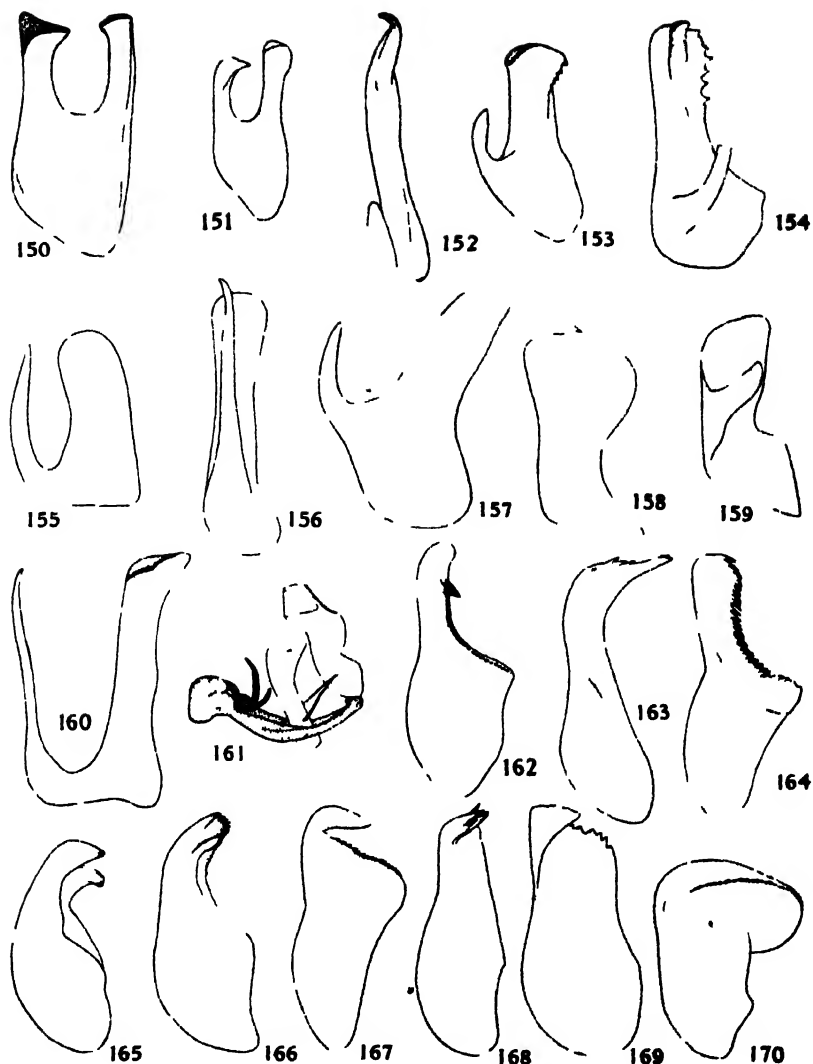
GENITALIA OF LYCAENIDAE (continued)

- | | |
|---|--|
| 116 <i>Allotinus taras</i> (right valva and aedeagus) | 124 <i>Niphande cymbis</i> |
| 117 <i>A. panormis</i> (right valva and aedeagus) | 125 <i>N. tessellata</i> (right valva) |
| 118 <i>A. strigatus</i> (right valva and aedeagus) | 126 <i>N. asiaticus</i> |
| 119 <i>A. berninus</i> (right valva and aedeagus) | 127 <i>Eloes lacturnus</i> |
| 120 <i>Laganis marmorata</i> | 128 <i>E. potanini</i> (right valva) |
| 121 <i>Taraka humada</i> | 129 <i>Lycanopsis barakus</i> |
| 122 <i>Castalis roosei</i> | 130 <i>Colastinus jellisoni</i> |
| 123 <i>C. oides</i> (right valva) | 131 <i>C. melana</i> (right valva) |



GENITALIA OF LYCAENIDAE (continued)

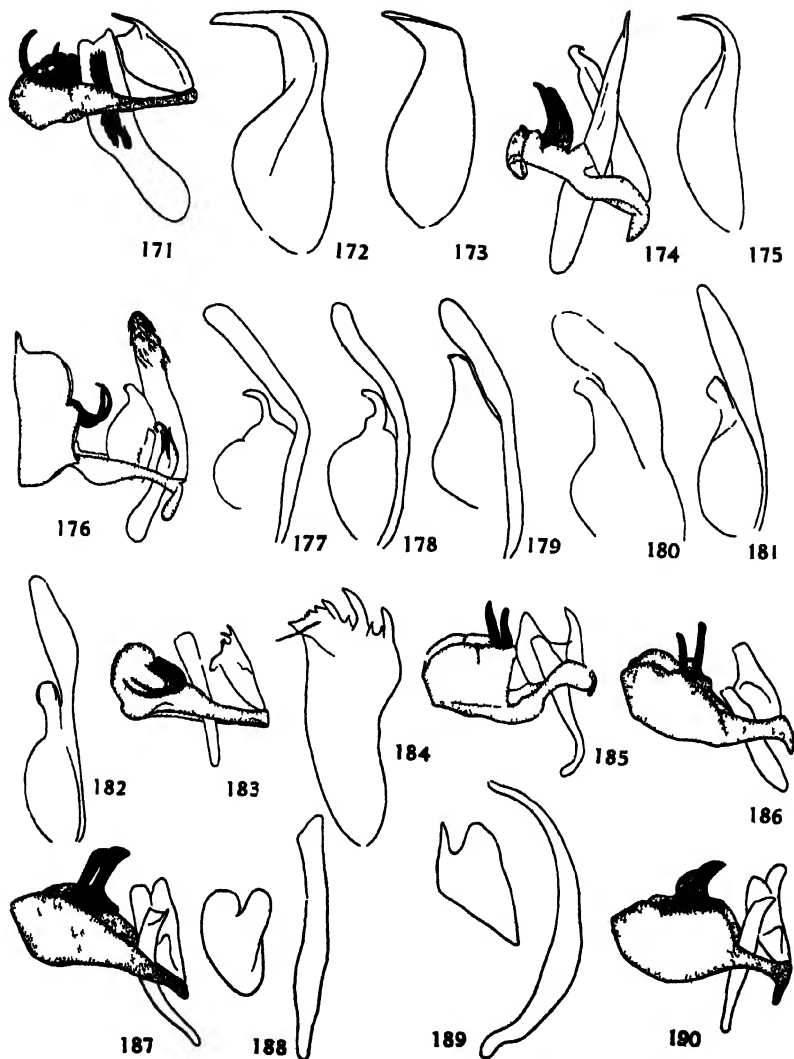
- | | |
|--|---------------------------------------|
| 132 <i>Colastrina cyma</i> (right valva) | 141 <i>C. placidula</i> (right valva) |
| 133 <i>C. puspa</i> (right valva) | 142 <i>C. murina</i> (right valva) |
| 134 <i>C. carna</i> (right valva) | 143 <i>Zizina otis</i> |
| 135 <i>C. coelata</i> (right valva) | 144 <i>Zizina karyna</i> |
| 136 <i>C. cyus</i> (right valva) | 145 <i>Zizila hylax</i> |
| 137 <i>C. camenae</i> (right valva) | 146 <i>Euchrysops enejus</i> |
| 138 <i>C. diluctus</i> | 147 <i>E. pandava</i> |
| 139 <i>C. singularis</i> (right valva) | 148 <i>Lampides boeticus</i> |
| 140 <i>C. lumbata</i> (right valva) | 149 <i>Jamides caerulea</i> |



GENITALIA OF LYCAENIDAE (continued)

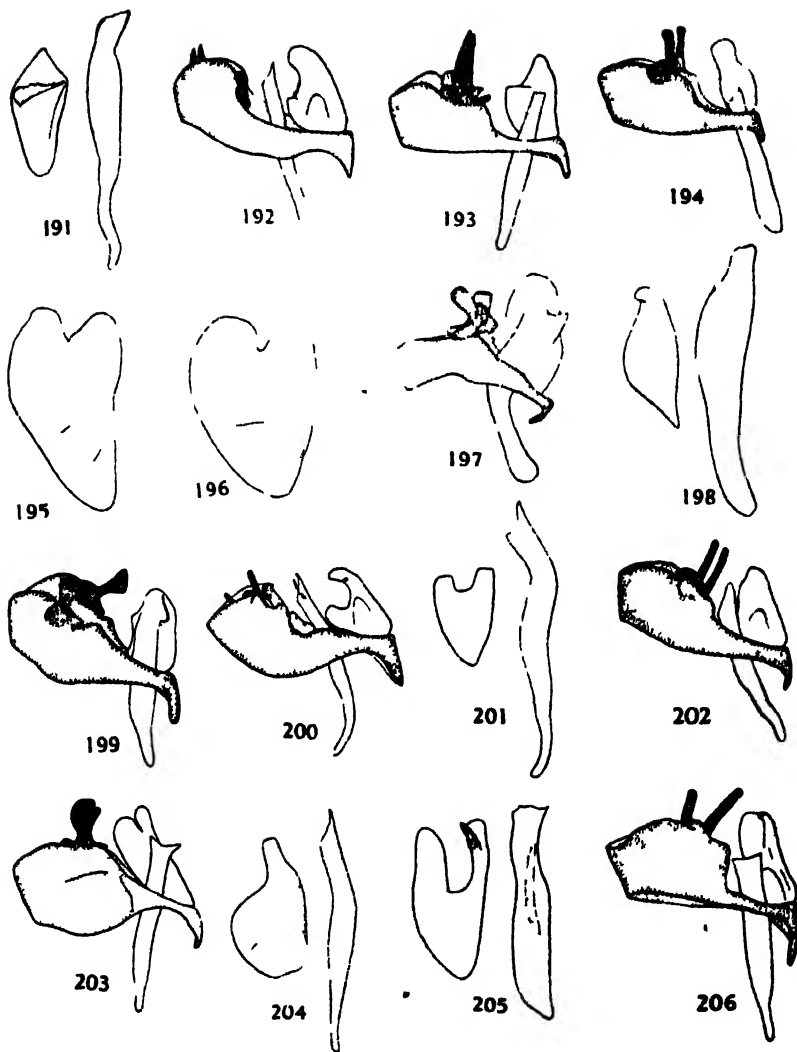
- 150 *Jamides celeno* (right valva)
 151 *J. pura* (right valva)
 152 *J. zebra* (right valva)
 153 *J. malaccanus* (right valva)
 154 *J. parasaturata* (right valva)
 155 *J. talanga* (right valva)
 156 *J. alpis* (right valva)
 157 *J. aleo* (right valva)
 158 *J. ferrari* (right valva)
 159 *J. cunilda* (right valva)
 160 *J. philatus* (right valva)

- 161 *Nacaduba asaga*
 162 *N. angusta* (right valva)
 163 *N. pactolus* (right valva)
 164 *N. hormus* (right valva)
 165 *N. samaya* (right valva)
 166 *N. pavana* (right valva)
 167 *N. karana* (right valva)
 168 *N. borea* (right valva)
 169 *N. bernice* (right valva)
 170 *N. calauria* (right valva)



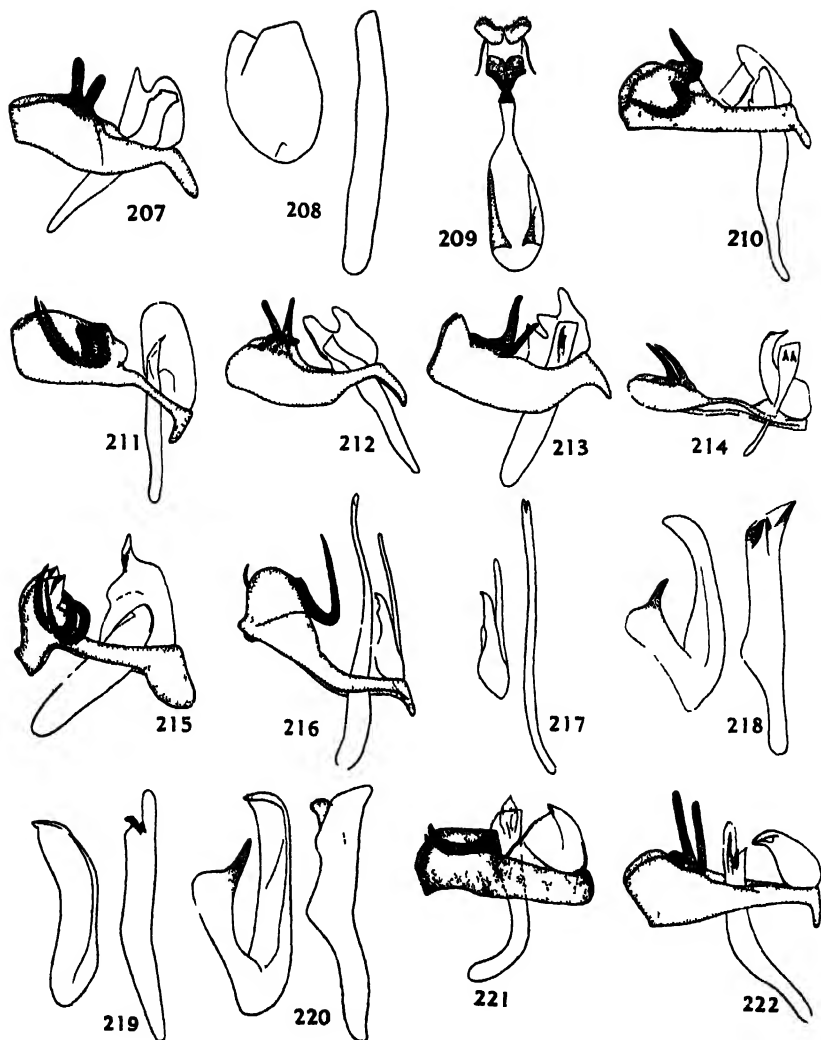
GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|--|-----|---|
| 171 | <i>Nacaduba holcon</i> | 181 | <i>C. tagaica japa</i> (right valva) |
| 172 | <i>N. naldus</i> (right valva) | 182 | <i>C. tagaica labuana</i> (right valva) |
| 173 | <i>N. nora</i> (right valva) | 183 | <i>Amblypodia ants</i> |
| 174 | <i>Petroessa dana</i> | 184 | <i>A. narada</i> (right valva) |
| 175 | <i>N. dubiosa</i> (right valva) | 185 | <i>Machetula amera</i> |
| 176 | <i>Caretus regala</i> | 186 | <i>Arhopala anthelus</i> |
| 177 | <i>C. sperthis</i> (right valva) | 187 | <i>A. ateris</i> |
| 178 | <i>C. buki</i> (right valva) | 188 | <i>A. pseudomata</i> (right valva and aedeagus) |
| 179 | <i>C. insularis</i> (right valva) | 189 | <i>A. allata</i> (right valva and aedeagus) |
| 180 | <i>C. thetis sumatrana</i> (right valva) | 190 | <i>A. melanura</i> |



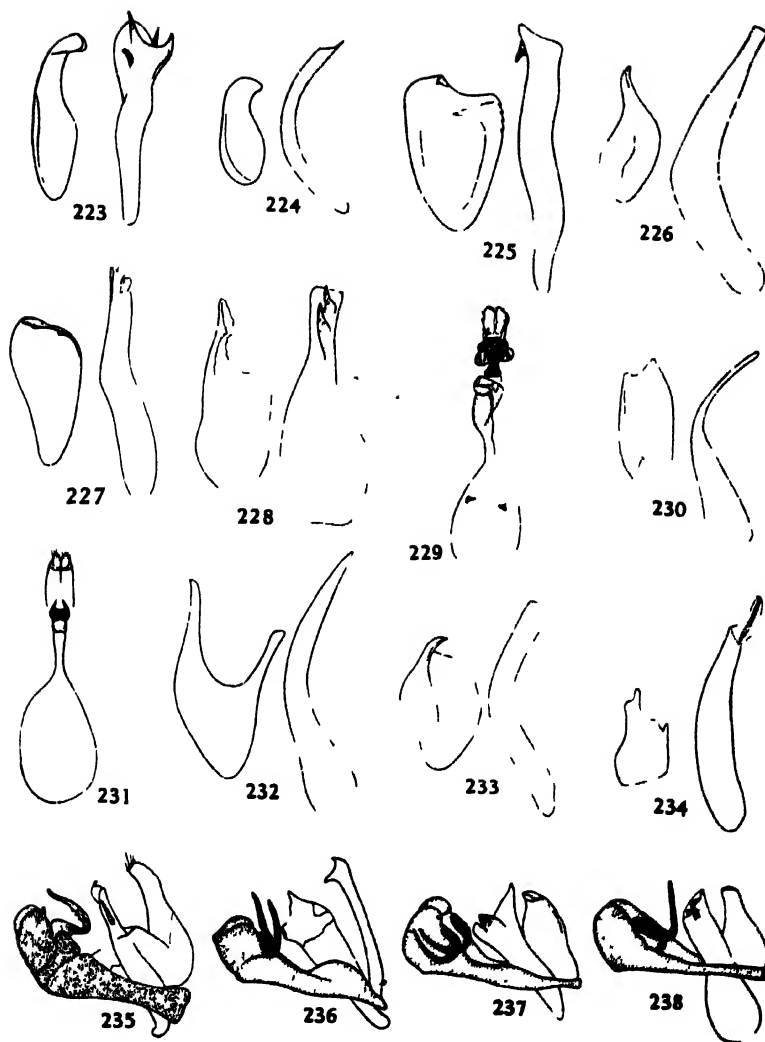
GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|---|-----|---|
| 191 | <i>Atripales hypomus</i> (right valva and aedeagus) | 199 | <i>A. alians</i> |
| 192 | <i>A. mus</i> | 200 | <i>A. agrus</i> |
| 193 | <i>A. meolians</i> | 201 | <i>A. ex</i> (right valva and aedeagus) |
| 194 | <i>A. apollon</i> | 202 | <i>A. kungs</i> |
| 195 | <i>A. amphimys</i> (right valva) | 203 | <i>A. perimys</i> |
| 196 | <i>A. axis</i> (right valva) | 204 | <i>A. insens</i> (right valva and aedeagus) |
| 197 | <i>A. apollon</i> | 205 | <i>A. antius</i> (right valva and aedeagus) |
| 198 | <i>A. similis</i> (right valva and aedeagus) | 206 | <i>A. antius</i> |



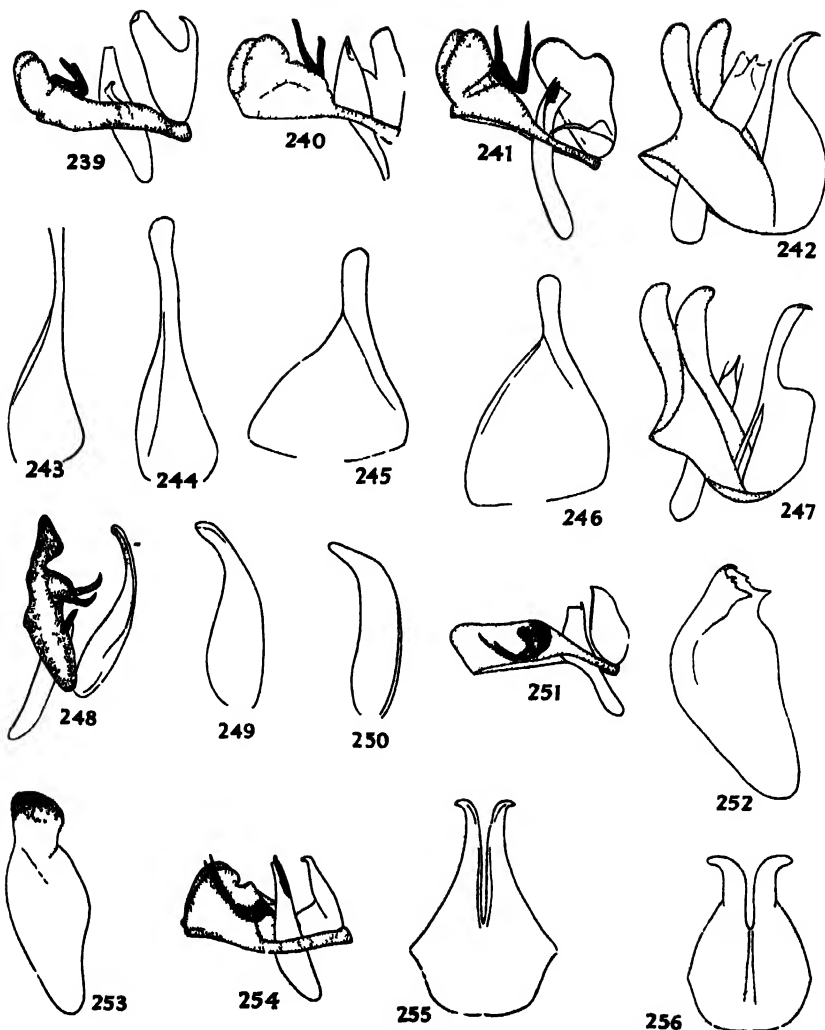
GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|--|-----|--|
| 207 | <i>Arhopala cooperi</i> | 215 | <i>Spindaris lehita</i> |
| 208 | <i>A. corinda</i> (right valva and aedeagus) | 216 | <i>Pratapa ctasia</i> |
| 209 | <i>A. eumolpus</i> (female) | 217 | <i>P. blanka</i> (right valva and aedeagus) |
| 210 | <i>A. horfieldi</i> | 218 | <i>P. dora</i> (right valva and aedeagus) |
| 211 | <i>A. cardoni</i> | 219 | <i>P. icetoides</i> (right valva and aedeagus) |
| 212 | <i>A. arvina</i> | 220 | <i>P. icetes</i> (right valva and aedeagus) |
| 213 | <i>A. diardi</i> | 221 | <i>P. cleobis</i> |
| 214 | <i>Drina mania</i> | 222 | <i>P. issus</i> |



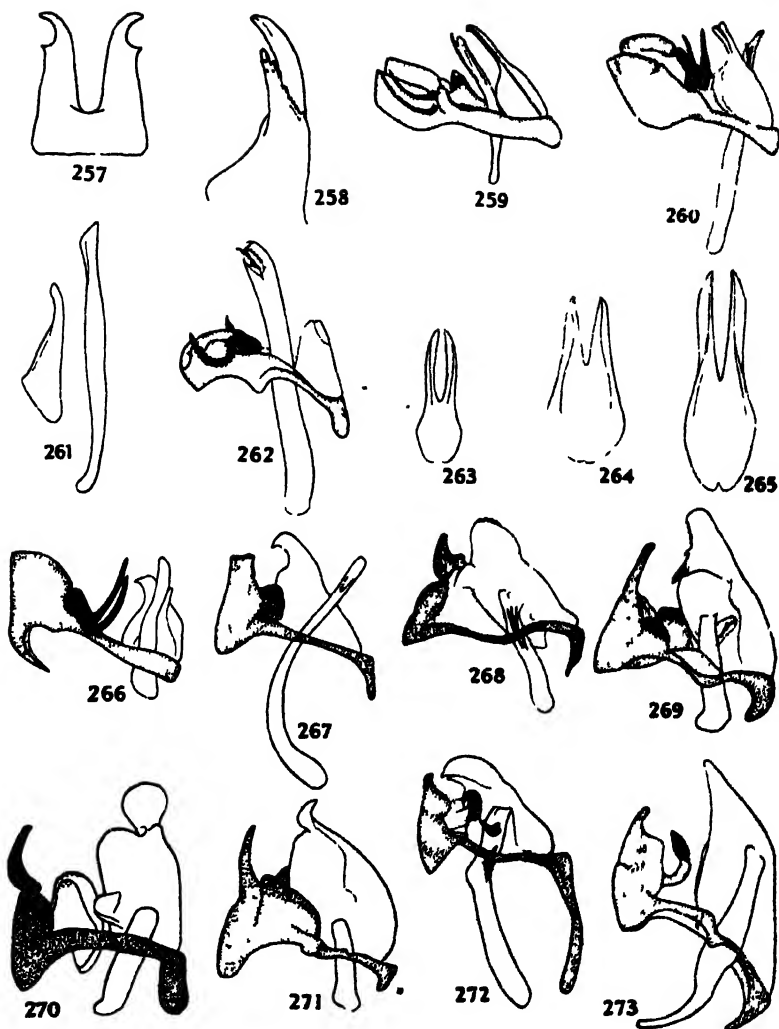
GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|--|-----|---|
| 223 | <i>Protepe illurgioides</i> (right valva and aedeagus) | 231 | <i>P. mantra</i> (female) |
| 224 | <i>P. luculentus</i> (right valva and aedeagus) | 232 | <i>P. dominus</i> (right valva and aedeagus) |
| 225 | <i>P. cippus</i> (right valva and aedeagus) | 233 | <i>P. bute</i> (right valva and aedeagus) |
| 226 | <i>P. ister</i> (right valva and aedeagus) | 234 | <i>P. cleoboides</i> (right valva and aedeagus) |
| 227 | <i>P. jalajala</i> (right valva and aedeagus) | 235 | <i>Charana jalindra</i> |
| 228 | <i>P. deudorix</i> (right valva and aedeagus) | 236 | <i>C. mandarinus</i> |
| 229 | <i>P. deudorix</i> (female) | 237 | <i>Jacoma ananaja</i> |
| 230 | <i>P. mantra</i> (right valva and aedeagus) | 238 | <i>J. aurita</i> |



GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|--|-----|--|
| 239 | <i>Jacoma scopula</i> | 248 | <i>Horaga albimaculata</i> |
| 240 | <i>J. hypoleuca</i> | 249 | <i>H. ocyx</i> (right valva) |
| 241 | <i>J. gama</i> | 250 | <i>H. gyrus</i> (right valva) |
| 242 | <i>Marmessus ravindra</i> | 251 | <i>Calopsephus elegans</i> |
| 243 | <i>M. scawa</i> (left lobe of uncus) | 252 | <i>C. major</i> (right valva) |
| 244 | <i>M. estella</i> (left lobe of uncus) | 253 | <i>C. subochrus</i> (right valva) |
| 245 | <i>M. thetis</i> (left lobe of uncus) | 254 | <i>Otharis line</i> |
| 246 | <i>M. scudderii</i> (left lobe of uncus) | 255 | <i>C. tora</i> (right and left valvae) |
| 247 | <i>M. rufotarsus</i> | 256 | <i>C. amabilis</i> (right and left valvae) |

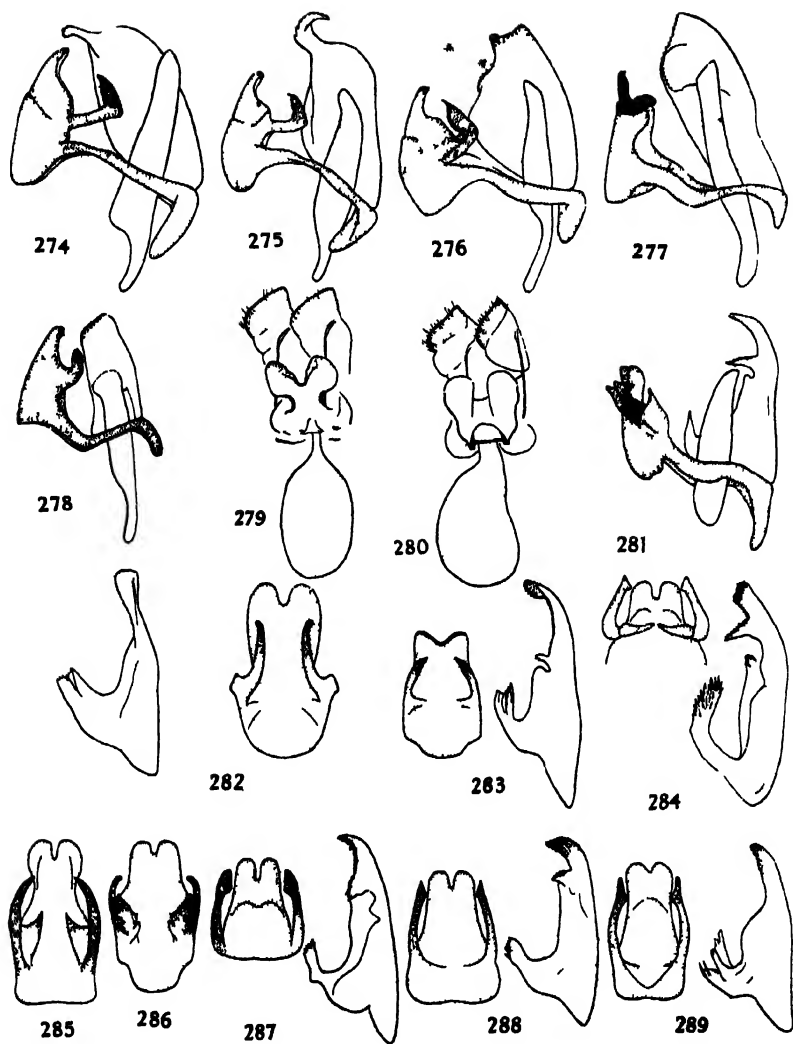


GENITALIA OF LYCAENIDAE (continued)

- | | | | |
|-----|---|-----|--|
| 257 | <i>Catapacihna morganis</i> (right and left valvae) | 262 | <i>Rapala ierbus</i> (both valvae shown) |
| 258 | <i>Hypolycaena cyllus</i> (right valva) | 263 | <i>R. abnormis</i> (right and left valvae) |
| 259 | <i>Rumicula jangala</i> | 264 | <i>R. phorinus</i> (right and left valvae) |
| 260 | <i>Dendroxiphius</i> (both valvae shown) | 265 | <i>R. dracoma</i> (right and left valvae) |
| 261 | <i>D. elisi</i> (right valva and aedeagus) | 266 | <i>Lipyrus brassilis</i> |

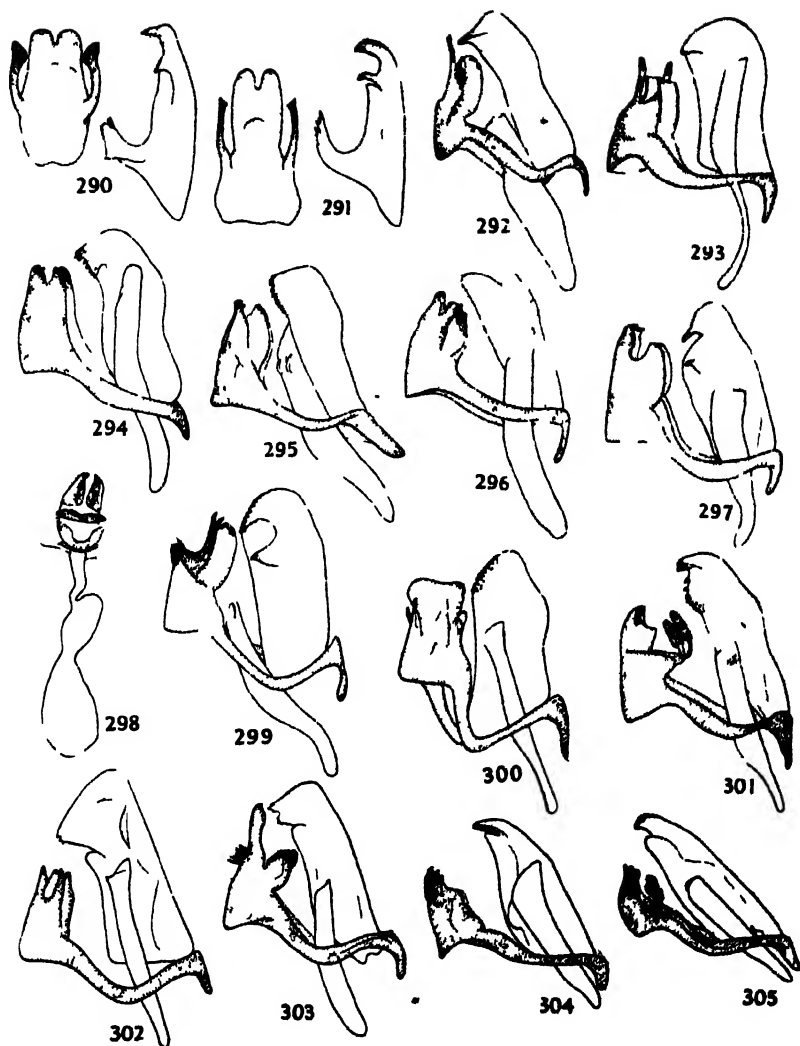
GENITALIA OF HESPERIIDAE

- | | | | |
|-----|--------------------------|-----|---------------------------------|
| 267 | <i>Bibasis oedipodes</i> | 271 | <i>C. hemicanthus</i> |
| 268 | <i>Hasora vitta</i> | 272 | <i>Calamorrhinus auristatus</i> |
| 269 | <i>Chasmodon platoni</i> | 273 | <i>Tagiades litigiosus</i> |
| 270 | <i>C. subcinctus</i> | | |



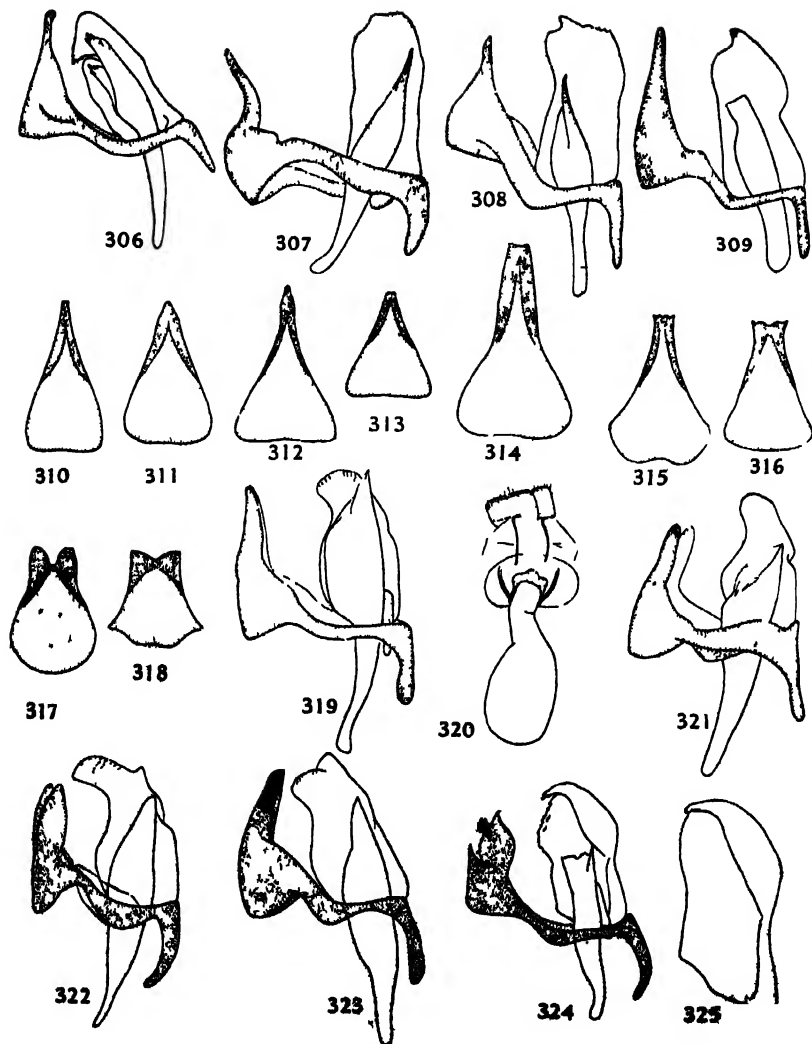
GENITALIA OF HESPERIIDAE (continued)

- | | | | |
|-----|--|-----|---|
| 274 | <i>Tagades ultra</i> | 283 | <i>H. zola</i> (ventral view of uncus and right valva) |
| 275 | <i>T. memaka</i> | 284 | <i>H. hamolea</i> (ventral view of uncus and right valva) |
| 276 | <i>T. cohaerens</i> | 285 | <i>H. arcuata</i> (ventral view of uncus) |
| 277 | <i>Asticlepterus jama</i> | 286 | <i>H. flava</i> (ventral view of uncus) |
| 278 | <i>Aeromachus dubius</i> | 287 | <i>H. auriferus</i> (ventral view of uncus and right valva) |
| 279 | <i>A. dubius</i> (female) | 288 | <i>H. kusala</i> (ventral view of uncus and right valva) |
| 280 | <i>A. flava</i> (female) | 289 | <i>H. poliothraix</i> (ventral view of uncus and right valva) |
| 281 | <i>Halpe porus</i> | | |
| 282 | <i>H. zama</i> (right valva and ventral view of uncus) | | |



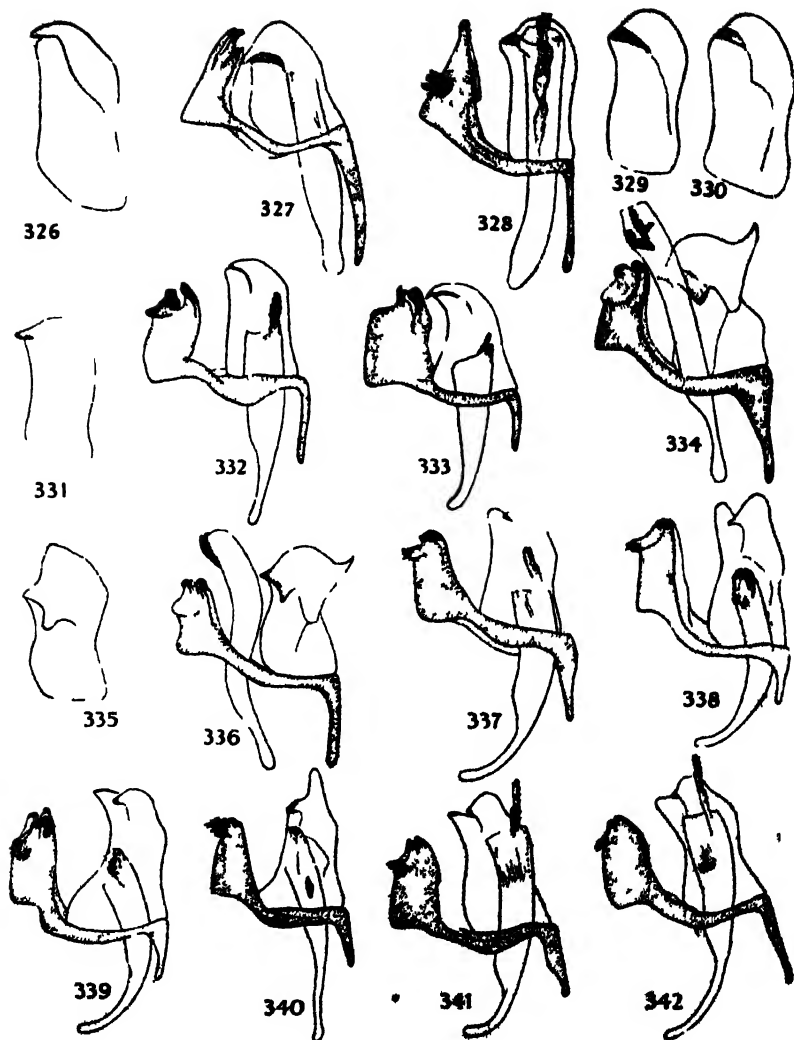
GENITALIA OF HESPERIIDAE (continued)

- | | | | |
|-----|--|-----|-------------------------------|
| 290 | <i>Halpe wastons</i> (ventral view of uncus and right valva) | 297 | <i>Ancistroides nigris</i> |
| 291 | <i>H. solwani</i> (ventral view of uncus and right valva) | 298 | <i>A. armatus</i> (female) |
| 292 | <i>Iambrix salsala</i> | 299 | <i>Notocrypta paralyssae</i> |
| 293 | <i>I. distanti</i> | 300 | <i>Hyarotis tadara</i> |
| 294 | <i>Keruthnales butleri</i> | 301 | <i>Quadratua monticola</i> |
| 295 | <i>K. sindu</i> | 302 | <i>Isma umbrosa</i> |
| 296 | <i>Pales fuligo</i> | 303 | <i>Platystrophia laticola</i> |
| | | 304 | <i>Erimnusa torus</i> |
| | | 305 | <i>E. thrax</i> |



GENITALIA OF HESPERIIDAE (continued)

- | | | | |
|-----|---|-----|---|
| 306 | <i>Gs. gola</i> | 316 | <i>P. jelskii</i> (ventral view of uncus) |
| 307 | <i>Oreus goloides</i> | 317 | <i>P. jelskii</i> (ventral view of uncus) |
| 308 | <i>O. gola</i> | 318 | <i>P. jelskii</i> (ventral view of uncus) |
| 309 | <i>Potamophilus omaha</i> | 319 | <i>P. jelskii</i> (female) |
| 310 | <i>P. omaha</i> (ventral view of uncus) | 320 | <i>P. jelskii</i> |
| 311 | <i>P. rectifasciata</i> (ventral view of uncus) | 321 | <i>P. jelskii</i> |
| 312 | <i>P. trachala</i> (ventral view of uncus) | 322 | <i>P. jelskii</i> |
| 313 | <i>P. jelskii</i> (ventral view of uncus) | 323 | <i>P. jelskii</i> |
| 314 | <i>P. confucius</i> (ventral view of uncus) | 324 | <i>P. jelskii</i> |
| 315 | <i>P. jelskii</i> (ventral view of uncus) | 325 | <i>P. jelskii</i> (right valva) |



GENITALIA OF HESPERIDAE (continued)

- | | | | |
|-----|------------------------------------|-----|--------------------------------|
| 326 | <i>Parnara ganga</i> (right valva) | 335 | <i>B. poolei</i> (right valva) |
| 327 | <i>Rebo cinnara</i> | 336 | <i>B. pusillula</i> |
| 328 | <i>Peleptis nathia</i> | 337 | <i>Callista olivacea</i> |
| 329 | <i>P. nathia</i> (right valva) | 338 | <i>C. celsa</i> |
| 330 | <i>P. agne</i> (right valva) | 339 | <i>C. brevis</i> |
| 331 | <i>P. alpe</i> (right valva) | 340 | <i>C. straminea</i> |
| 332 | <i>Polyommata alpestris</i> | 341 | <i>C. nalgia</i> |
| 333 | <i>P. alpe</i> | 342 | <i>C. brevis</i> |
| 334 | <i>Thaïs ferri</i> | | |

PLATES 22-28

The following plates and frontispiece illustrate in colour a number of genera and species selected because of their rarity beauty or the difficulty of indicating their specific differences in black and white or to illustrate geographical variation

PLATE 22

MALAYAN RACES OF *IXYLIS PYRENE* (L.)

This widely distributed insect is one of the few Malayan butterflies with a series of geographical races on the Malayan mainland. The race (or subspecies) *verna* (H. Druce) (1 and 2) is found in open country in Kedawi, the race *birdi* (Distant) (3 and 4) frequents forest paths on the plains in Malaya proper, while *alticola* (Pendlebury) (5 and 6) occurs in rather open forest in a few localities on the hills of the main range. Superficially, the female of the Bornean race *undatus* (Butler) (7 and 8) resembles a species of *Delias*. The males and females are on the left and right respectively.

PLATE 23

GEOGRAPHICAL RACES OF *EUPLOEA SYLVESTER* FABRICIUS

From Ceylon to New Guinea and eastwards, it is usual for each species of butterfly to be represented by a distinct geographical race on each of the larger or more remote islands, although, not infrequently, the representatives from Malaya, Sumatra and Borneo are similar, if not identical. The Danaid genus *Euploea* presents some particularly striking examples of insular differentiation, in general all the species present on an island showing parallel modifications in the wing pattern. Indeed, in such cases it is easier to ascertain the country of origin of a specimen than to determine its specific identity, although the male can be identified by the genitalia and the secondary sexual characters. *Euploea sylvester* can be distinguished by the two long black bands present on the forewing in the male. The races shown are from: (1) Ceylon, (2) North India, (3) Malaya, (4) Nias, (5) Luzon, (6) Celebes, (7) Timor, and (8) New Guinea.

PLATE 24

ELYMNIAS KUENSTLERI HONRATH

Elymnias kuenstleri is one of the rarest Malayan butterflies and is equally scarce on the large Sunda Islands. The male (1) has been taken only once in Malaya, and this sex is still unknown in Borneo. In flight the male of *E. kuenstleri* is a perfect mimic of *Euploea algea* (Godart), while, in spite of some disparity in size, the female (2) exactly resembles *Idea lynceus* (Drury) (3).

The specimens of *Elymnias kuenstleri* shown were taken at the same time and within a few days on Bukit Kutu in April 1931 : both the Danaid models were on the wing at the same time.

PLATE 25

THE GENUS *AMATHUSIA* FABRICIUS

This genus comprises eight closely allied species which, except for the widespread *A. phidippus* and a single species confined to the Celebes, are entirely Malaysian in distribution. The larvæ of *A. phidippus* and *A. gunneryi* feed on the coconut palm, and the butterflies may be seen in rapid flight around the tree tops at dusk ; occasionally they enter dwelling-houses in the evening. The remaining species are very rare denizens of the primary forest, and their identification is not easy.

The males figured are : (1) *A. gunneryi* (Corbet and Pendlebury) ; (2) *A. phidippus chersias* (Fruhstorfer) ; (3) *A. binghami* (Fruhstorfer) ; (4) *A. masina malaya* (Corbet and Pendlebury) ; (5) *A. perakana perakana* (Honrath) ; (6) *A. schoenbergi schoenbergi* (Honrath) ; (7) *A. ochraceofusca ochraceofusca* (Honrath).

PLATE 26

THE MALAYAN FORMS OF *HYPOLIMNAS BOLINA* (L.)

Hypolimnas bolina is distributed almost throughout the Oriental Region and, in spite of its migratory tendencies, it gives rise to very distinct subspecies in some parts of its range. Previous to 1900, the female of the Malayan form was indistinguishable from that sex of the Burmese race *H. bolina incommoda* Butler. For the first quarter of the present century, however, the species appears to have been absent from the Peninsula, but it reappeared about 1934, and is now not uncommon in southern Malaya. The female forms now present are identical with those of the subspecies *H. bolina bolina* (L.), and there is little doubt that Malaya has been recolonised from Java.

The Malayan females here shown represent *H. bolina incommoda* (Butler) (1 and 2) and *H. bolina bolina* (L.) (3 and 4).

PLATE 27

THE SPECIES OF PORITINAE

see page 259

- | | |
|--|--|
| 1 <i>Cyanirides libna andersoni</i> (Moore) ♂ | 12 <i>Pontia corynoides phraatica</i> Hewitson |
| 2 <i>Simiskina phalena phalena</i> (Hewitson) | |
| 3 <i>Cyanirides libna andersoni</i> (Moore) | 13 <i>P. promula elegans</i> Trubstorfer ♂ |
| 4 <i>Detamas lucus lucus</i> Distant ♂ | 14 <i>Simiskina phalena choti</i> (Corbet) |
| 5 <i>D. lucus lucus</i> Distant ♂ underside | 15 <i>Pontia promula elegans</i> Trubstorfer ♀ |
| 6 <i>D. lucus lucus</i> Distant | 16 <i>Simiskina pharyge deolina</i> (Trubstorfer) ♂ |
| 7 <i>Pontia sumatrae sumatrae</i> (C. and R. Felder) ♂ | 17 <i>S. pharyge deolina</i> (Trubstorfer) underside |
| 8 <i>P. sumatrae sumatrae</i> (C. and R. Felder) ♀ underside | 18 <i>S. pharyge deolina</i> (Trubstorfer) |
| 9 <i>P. sumatrae sumatrae</i> (C. and R. Felder) | 19 <i>S. phalia potina</i> (Hewitson) ♂ |
| 10 <i>P. corynoides phraatica</i> Hewitson ♂ | 20 <i>S. phalia potina</i> (Hewitson) ♂ underside |
| 11 <i>P. corynoides phraatica</i> Hewitson ♂ underside | 21 <i>S. phalia potina</i> (Hewitson) ♀ |

All specimens figured are Malayan

The brilliantly coloured butterflies pertaining to the Poritinae in the Lycenidae are appropriately known as the "Gems". They are almost entirely confined to south Burma, where some species may be locally common, and to Malaysia, where they are generally rare. They are confined to the forest in Malaysia and are usually taken early in the day. All species show a marked sexual dimorphism, and in some identification of the male is not easy.

PLATE 28

THE *LARACTROCTA* GROUP OF HESPERIIDAE

see page 417

- | | |
|---|--|
| 1 <i>Taractrocta andania umahen</i> (Evans) ♂ | 16 <i>Polanthus umaha umaha</i> (W. H. Edwards) ♂ |
| 2 <i>T. archias quinta</i> Swinhoe ♂ | 17 <i>P. c. n. fuscus dushta</i> (Truhstorfer) ♂ |
| 3 <i>T. archias quinta</i> Swinhoe | 18 <i>P. para para</i> (Truhstorfer) ♂ |
| 4 <i>T. aluna aluna</i> (Plotz) ♂ | 19 <i>P. fa a fa a</i> (Truhstorfer) |
| 5 <i>T. aluna aluna</i> (Plotz) | 20 <i>P. lydia fraseri</i> (Evans) ♂ |
| 6 <i>Oreus parapsa</i> (Nic. Villo) ♂ | 21 <i>L. h. t. c. l. m. stinza</i> (Evans) ♂ |
| 7 <i>O. coloides</i> (Moore) ♂ | 22 <i>Polanthus andia andia</i> (Truhstorfer) ♂ |
| 8 <i>O. coloides</i> (Moore) | 23 <i>P. h. l. a. c. m. s. m.</i> (Plotz) ♂ |
| 9 <i>O. gola pseudolus</i> (Mabille) ♂ | 24 <i>L. ch. d. a. u. s. t. a. s. a. u. s. t. a. s.</i> () ♂ |
| 10 <i>O. gola pseudolus</i> (Mabille) | 25 <i>L. c. o. l. u. s. t. i. n. z. a</i> (Evans) |
| 11 <i>Polanthus rectifasciata</i> (Hewes and Edwards) ♂ | 26 <i>L. luna luna</i> (Evans) ♂ |
| 12 <i>P. trachala tyleri</i> (Evans) ♂ | 27 <i>L. hera ty</i> (Evans) ♂ |
| 13 <i>P. trachala tyleri</i> (Evans) | 28 <i>L. shara py</i> (Evans) |
| 14 <i>P. juno juno</i> (Evans) ♂ | 29 <i>C. ph. n. e. s. ch. r. y. s. o. m. a. n. a. s. t. a.</i> (Plotz) ♂ |
| 15 <i>P. juno juno</i> (Evans) | 30 <i>Cupitha purica</i> (Moore) ♂ |
| | 31 <i>C. ph. n. e. s. ch. r. y. s. o. m. a. n. a. s. t. a.</i> (Plotz) |

All Malayan except numbers 6, 7, 11, 14, 18 and 31 from Burma, number 10 from Sumatra, and number 4 from Java, of which Malayan specimens were not available.

Many of the Malayan species of the *Laractrocta* group are bewilderingly similar in wing pattern and the differences between them are more easily discerned by the eye than described by the pen. Fortunately the males of all species show distinct differences in the genitalia, but the identification of females may be difficult. The plate depicts all the Malayan species of the group, as well as the superficially similar *Cupitha purica* (Moore).

PLATE 29

ORIENTAL BUTTERFLIES IN THE LINNAEAN
COLLECTION IN THE POSSESSION OF THE
LINNEAN SOCIETY OF LONDON

1. *Delias aglaja aglaja* (L.), ♀. Type of *Papilio aglaja* L. and *P. pasithoe* L. (Canton, [1751, *P. Osbeck*]).
2. *Delias belladonna belladonna* (F.), ♀. Type of *Papilio belladonna* F. (West China).
3. *Danaus chrysippus chrysippus* (L.), ♂. Type of *Papilio chrysippus* L. (Canton, 1751, *P. Osbeck*).
4. *Danaus genutia Cramer*, ♂. [*Papilio plexippus* L. partim]. (Canton, 1751, *P. Osbeck*).
5. *Danaus similis similis* (L.), ♂. Type of *Papilio similis* L. (Canton, 1751, *P. Osbeck*).
6. *Eurema hecabe hecabe* (L.), ♀. Type of *Papilio hecabe* L. (Canton, [1751, *P. Osbeck*]).
7. *Ypthima philomela philomela* (L.), ♂. Type of *Papilio philomela* L. (Java, *H. J. Nordgreen*).
8. *Erionota thrax thrax* (L.), ♂. Type of *Papilio thrax* L. (Java).
9. *Mycalesis mineus mineus* (L.), ♀. Type of *Papilio mineus* L. (Canton, 1751, *P. Osbeck*).
10. *Telicota augias augias* (L.), ♂. Type of *Papilio augias* L. (Java, *H. J. Nordgreen*).

PLATE 30

MALAYSIAN BUTTERFLIES IN THE BANKS COLLECTION
IN THE BRITISH MUSEUM (NATURAL HISTORY)

1. *Valeria valeria hippia* (F.), ♂. Type of *Papilio hippia* F. (Pulau Condore, 1780, [D. Nelson]).
2. *V. valeria lutescens* (Butler), ♀. Type of *Papilio philomela* F. ([Malacca, 1779, J. G. Koenig]).
3. *Indula crota crota* (F.), ♀. Type of *Papilio crota* F. ([Pulau Salang, 1779, J. G. Koenig]).
4. *Parthenos sylvia gambrisius* (F.), ♂. Type of *Papilio gambrisius* F. (Pulau Condore, 1780, W. Bailey).
5. *Tanaccia pelea pelea* (F.), ♀. ([Malacca, 1779, J. G. Koenig]).
6. *Lebadea martha martha* (F.), ♂. Type of *Papilio martha* F. (Pulau Salang, 1779, J. G. Koenig).
7. *Tagiades jupetius khasiana* Moore, ♀. (Pulau Condore, 1780, D. Nelson).

PLATES 31-55

On the following plates are illustrated all the better known Malayan Butterflies, and also others which are difficult to identify without illustrations.

All the specimens figured are Malayan, except where the name of the country of origin follows the name of the butterfly.